City Park, 5/12 1912
E Iowa City 6/4 "
Okoboji 7/31/8/11 1913
Okoboji 11/30 8/12-9 "
Canton S.D. 8/15-12 "
Hampton to Iowa City 9/12 "
~~Shelby 8/27~~ "
~~Ft Dodge 8/9~~ "

Peale - May 21 - 1912

Upland

Q. alba
Q. rubra
Q. velutina
Ulmus fulva
" americana
Q. macrocarpa
Carya alba vera
Ostrya virginiana
Juglans nigra
Pinus strobus (planted)
Tilia americana
Fraxinus lanceolata (green)
Populus tremuloides
Prunus serotina

Lowest bottom —

Ulmus americana
Juglans nigra
Fraxinus green ash,
Betula nigra
Salix nigra
Q. macrocarpa — mostly bur
Carya amara — pecan
Crataegus mollis
Acer negundo
Gymnocladus dioica
Celtis —
Salix amygdaloides
Acer saccharinum
Platanus occidentalis
Populus deltoides

Upper bottom May 27-1912

Betula nigra
Ulmus americana
Crataegus mollis
Fraxinus green ash
5 Quercus macrocarpa
Gymnocladus dioica
~~Acer saccharinum~~
Quercus rubra
" velutina
10 Juglans nigra
Crataegus tomentosa
Fraxinus pennsylvanica lanceolata
Celtis occidentalis
Carya amara
15 Fraxinus nigra
Prunus serotina
Zizia aurea
Prunus americana

June 4, 1912

Prairie E. of Iowa City

~~fr~~ Physalis pubescens fl.
Ceanothus americanus - Broad (well)
Achillea millefolium - fl
Equisetum ~~[illegible]~~ hyemale var. - fr.
Lithospermum canescens - fl. & fr.
Rhus glabra - leaf
Erigeron ramosus fl.
Salvia verticillata fl.
Potentilla canadensis fl.
Hypoxis hirsuta fl.
Oenothera - (leaf) in bud.
Scutellaria parvula fl.
Kuhnia eupatorioides fl.
Cacalia tuberosa - bud
Krigia amplexicaulis - fl.
Baptisia leucantha fl.
Salix humilis leaf
Panicum scribnerianum fl.
Phlox pilosa fl.
Senecio glabellus (?) fl.
Arenaria caroliniana fl.
Carex scoparia fl.
Houstonia longifolia fl.
Lobelia

Selected quadrats on slope just S. of Old House
No. 7 RH.

1 - Phlox pilosa 7
2 - Oxalis violacea 14
3 - Andropogon scoparius
4 - Equisetum arvense 10
5 - Koeleria cristata 0
6 - Poa pratensis
7 - Hypericum hirsutum
8 - Taraxacum
9 - Carex cristata
10 - Equisetum hyemale
11 - Asyneuma campanulata
12 - Viola pedata
13 - Lespedeza hirta
14 - Viola sororia var. priceana
15 - Pedicularis canadensis
16 - Oenothera fruticosa
17 - Helianthemum canadense

2nd quadrat just 6th south

1 - Erigeron ramosus - 1
2 - Carex pedunculata 3
3 - Koeleria cristata 2 0
4 - Equisetum hyemale - 8
5 - " arvense - 7
6 - Oxalis violacea - 20+
7 - Antennaria plantaginifolia - 2
Hypericum crux
Erigeron philadelphicus
Asyneuma campanulata
Panicum - (fine)
Poa pratensis
Lithospermum canescens
Lespedeza hirta
Pedicularis canadensis
Viola pedata
Andropogon scoparius

(General list (cont))

Cynoglossum	[illegible]	fl.
Scutellaria	lateriflora	fl.
Parthenium	integrifolium	bor.
Arenaria	[illegible]	bor.
Pedicularis	canadensis	bor.
Stipa	spartea	fl.
Ellisia	nyctelea	fl.
Lobelia	[illegible]	fl.

Dec. 11 + 12 1912

Dec. 11	RR. to Des Moines	$2.41
	Elliot Hotel	1.00
	Supper	.35
Dec. 12	RR. to Audubon	2.16
	Breakfast Cardis Cafe Atlantic	.65

July + Aug. 1913

July 29	RR. to Cedar Rapids	.50
	~~Spirit Lake~~	4.46
July 30	Cedar R. to ~~to Okoboji~~	.10
	Spirit Lake to Io. Okoboji	.50
	Breakfast at Orleans	
Aug. 8 -	Boat - miss Annie Maiden	6.00
Aug. 8 -	Dinner, Supper + Lodging } Edwards	2.00
" 9 -	Breakfast	
" 8 -	Giddips - Supper - at Edwards	.50
" 9 -	RR. to Montgomery to Granite	.10
-	RR. Montgomery to Granite	1.65
-	RR. Granite to Sioux Falls	.36
-	Lodging Hotel Zeton " "	1.00
" 10 -	Breakfast " "	.30
Aug 8 -	Freight - Annie Maiden	1.31
	Express - Sud. - Bot Off Montgomery	.35
	Freight - Iowa Library Com - Books -	1.00
	Wm. Goddee - hauling	2.00

Dec. 11 - Wed 1912

Left Iowa City at 3.05 pm. for Des Moines. Lectured on "What shall we do with our River Bluffs" before Horticultural Society. Spent night at Elliot.

Dec. 12, Thurs. 1912

Left at about 4.30 am - too late for early train. Left Atlantic at 8.45 am. for Audubon.

~~Low RR. cut (6-7 ft) 1 yard before reaching depot at Corale. Seems to be overgrown just S. of town (now) 1½ miles above Corale is a similar, rather deeper cut. (This is - Audubon)~~

~~A mile farther on there seem to be a bench.~~

~~Brayton looks fair for stopping place. Has no livery, but there is one at Exira.~~

~~Charter bluffs to Audubon. Put up at Park Hotel. Found co. road-plan now in process of correction & will wait.~~

Hunted up Mayor Spencer.
Went to hotel for dinner
& then met Rev. Smith,
the Baptist State Sec. for
Rural Churches.
He introduced me to the
Co. Supt., Miss —
Mr. Cousins (uncle of Bob & a
native of Cedar Co.), to Mr.
Van , a lawyer, Mr. —
& Son, the former in general
mechanic, former Cashier,
Dr. May, an old grad.,
& on Doctor S. of Paul,
also druggist —
Mr. Smith was ordained
here & also married.
Before dinner I called on
Mr. Com. J. Lauhender city
clerk, who promised to get
well soon.
Afternoon hunted up

Mr. Henry Newman in
charge of well drill, & Mr.
R. Locke, his asst.
They represent the
J. P. Miller Artesian Well Co.
Chicago.
Obtained following records
soil at 100
at 3 3 ft. 4 & 5 ft. of sand
at 500 ft. 2 ft. of dark
stuff like coal
Below 500 ft. to 1140 —
Shale.
From 1140 – 2000 limestone
streaked with bits of
shale 2–5 ft. wide.
Limestone is gray & white
mixed —
Water nearly at 1425.
Then 50 ft. of green shale,
Then 55 ft. of gray sandstone
they call it St. Peters
Took samples of last
at 10–15 ft. and
25–30 ft.
Well is on flat opp CRI & P
depot.

There is a brickyard on flat near depot, used to be in bluffs on opp. side.

Mr. O.H. Jacobson, rep.-elect from Audubon co., owns a brick yard near Kimballton.

Mr. Newman & his crew drilled the Dunlap well, = 1550 ft.

Left at 4.30 for Atlantic.

Met Dr. Lachenmeier of Des Moines, of Audubon, with him to Des M.

Jennie's birthday
Sunrise Bay
July 31, 1913

On up part Cowan Occalintus St. tree come in, they run a little west of road - as a border. In this lower part the beach & shoes are flat

& there is a drain trough the G.W., yet there are tow-walk trees - nothing else.

Farther northward barley cove in & trees are denser & more varied.

Northward some of the tow-walk are large - {24 / 18 in. in diam.

All the trees in the lower part of gorge are tow-walking.

In Porchester St. gorge:

Bur-oak Quercus
Green ash Fraxinus
Vitis vulpina
Nuphelobia (see spec.)
Zapania virginica
Rumex alba
Thalictrum dioicum
Circaea lutetiana
Sanicula marilandica
~~Pilea pumila~~ Parietaria pennsylvanica
Chrysosplenium hydroides
Eupatorium ageratoides 17-
Rosa sonnd (few) Silia 9-8
Prunus americana
Ostrya (few)
Crataegus (no. III)
" mollis

Westward the bank flatens
out again & only bur oaks
appear — straggling —
The upper part of grove
is mostly green ash.
Many weeds in this grove.
The west end of grove
is not shelterd, & is like
S. end, — all scattered
bur oaks.

Level of lake 745
" of bottom lands 763 (19) 37
" top of ridge 782

The bur oaks on W. side
show lichens again on
W. side of trunk.

The ridge is here
protective.
Northward a fringe along shore
is all there is.
Dry as ash.

Bur oak Quercus macrocarpa
Salix discolor
Salix nigra
Amelanchier canadensis
Green ash Fraxinus
Elm Ulmus
Hazel Corylus am.
Am. Plum Prunus am.
Amelanchier
Chokecherry — Prunus virg.
Bittersweet — Celastrus
Red Elm Ulmus fulva
Cottonwood — Populus
Ribes floridum
Salix longifolia

16

Smaller plants are nearly
all prairie. — (this is open
& sandy, both)
Prairie plants
Symphoricarpos occidentalis
Lepachys pinnata
Helianthus scabra
Monarda mollis
Silene stellata
Viola ovata
Artemisia ludoviciana
Elymus canadensis
Polygonatum (small)
Artemisia (fine) dracunculus
Verbena stricta
Desmodium canadense
Apocynum cannabinum
Solidago nitida
Solidago canadensis

8

On sandy beach saw some
spots by crypt
[illegible] grasses & Zenobia
also:
Potentilla pentaphylla
Hordeum jubatum
Sentellaria ——— (see above) 1.
Polygonum persicaria
Artemisia — (fine dracunculus)
Polanisia —
Umbellularia — (see above)
Asparagus officinalis (1 tuft)
Verbena hastata
Cyperus — (small) (see above)
Amorpha fruticosa
Xanthium —
Ornithogalum —
Lycopus (not deeply cut)
Lactuca canadensis
Asclepias incarnata
Helianthus grosseserratus (deep)
Polygonum (with slender stems & broad leaves hyssopifolium)
Helianthus Rostratus palustris
Ambrosia artemisiifolia tribrachiata
Astragalus canadensis
Eupatorium perfoliatum
Iris versicolor
Solidago canadensis
Mentha canadensis
Lactuca canadensis (see above)

Just N. of steeple entrance a higher bank projects a little grove of trees & bushes are 15-18 ft. — all along is a fringe of trees

On E. side of steeple a rather abrupt slope bristles a fringe of trees - bushes & green ash

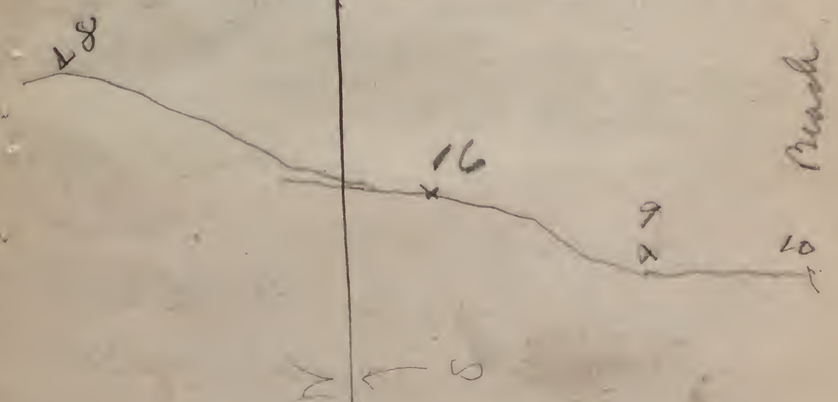
N. of rec. line on W. side Emerson Way there is a bank for some distance but only a fringe of trees has developed. As the bank fades out the trees disappear northward.

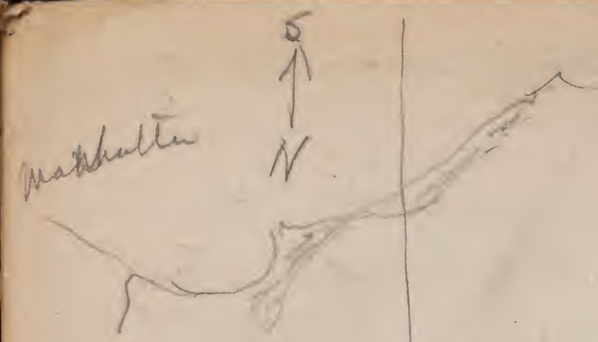
The turbine point in N. side also shows bank on S & West.

In afternoon started N. from Lab.

Took readings of Bents stations N. of Nullen's Bay

no. 10 on beach = 769
" 9 - behind bay = 770
" 16 - part way up = 780
" 8 - hill top = 820
" 7 - gravelly ridge E. of 8 = 811.





The timber along the shore S.W. of Manhattan is a mere fringe. The banks are high (15-20 ft) but only outlying bassons extend back westward, along this fringe I notice a bassoon, an Amelanchier a few green ash & mostly bur oaks; a few Am. elm.

The fringe runs out westward by a line of a few straggling stunted bur oaks.

Right at Manhattan the bur oaks run west a little farther, so that whole point is covered.

The Manhattan point is now (& probably always was) scantily covered with bowlders. The fringe up the lake is narrow & mostly brushy. A few grapevines, some quaking asp, salix cryptolepis, butternut,

At first point above Manhattan the grove widens to take in point, but consists almost entirely of bowlders.

At this first point above Manhattan the bank runs 10-12 ft above lake & is about all along.

Above this point there are a good many rather fine Populus tremuloides, with large number of seedlings springing up.

In the fringe I found — Tuesday

Eglantine
Rhus glabra
Ostrya virginiana
Barrowood Tilia am.
Amelanchier
Prunus americana
Crataegus nanopetala (?) (Lowerton lake)
Ribes gracile
Choke cherry Prunus virg.
Arrowleaf Viburnum
Red elm (few) Ulmus fulva
Anthelopsis Pseudera

In woods: (under part of fringe above 1st. above Manhattan)
Virginia creeper
Silene dilatata
Solidago canadensis
Symphoricarpos occidentalis
Aster Drummondii
Rubus occidentalis
Ribes floridum
Thalictrum polygamum
" dioicum
Tanacetum vulgare
Viola pubescens
Eupatorium ageratoides
Monarda (almost smooth)
Polygonum gigantea

Just above | bottling works is
most open | place.
From steamer:

Two open places show
between Manhatta + Equalhaw
both of them low, sloping
gradually to lake.

The opening at the bottling
works of Equalhaw shows
in same manner -
also another at upper part
of the curve of shore line
to next point above.

Then above this point +
its great artificial grove
is a low marsh place,
also trees.

North Queen & head of
lake, skipper plant
pies + starts towards
Equalhaw.

There are no trees (native)
at N. end. The shore is
flat + sandy, + very low
marsh land N. of road.
There are now some willows
+ cottonwoods, probably planted,
(quite evidently so).
There is a large artificial
grove NW. of bend of lake.
The cottonwood W. of landing
are in row along road (with
exception) + the willows
S. of lagoon are in a row,
with one cottonwood in same
row.

The NW. grove has
box elder, green ash
soft maple, red cedar small
walnuts, etc. hang lout
A group of cottonwoods
small ~~ash~~ are near
shore - evidently came
in irregularly + later
also some low green ashes.

above 1½ ft. above Manhattan
the bur oak grove widens to
nearly 100 yds, & most
of plants on prairie base
were in this grove - rather
~~open~~.
At westernmost part of
curve between Equalhave
& Magatta the banks
are lower & trees very
scant;
this is only a depression & again
the banks come up 15-20 ft
& there is a narrow border of
trees, only below bank
Towards Equalhave this
widens in 2 or 3 places where
ravines run down.

Alt. of beach at
Equalhave 765
Top of bluff 785

At Equalhave the
grove widens across
the point & contains
a big bur oak (nearly
3 ft in diam - Burt
photographs it.)
At Equalhave point
the grove must be at
least 150 yds wide
along from two bridges
the grove runs northward
to bottling works. The banks
drop to 5-7 ft. a few
large oaks above.
There are artificial groves
one west of part towards
bottling works & some
S & SW.
above the bottling works
the grove runs out into
a more fringe along shore
The shores are low.

These green ashes are near beach, exposed to wind, & are stunted.

Right at N.W. corner of lake there is a bank (short) 10 - 15 ft - but it has no trees. Slants a little to SW.

at (a) there is a broken fringe of greenash, cottonwood, peach, willow, Am. elm (1), plum, Amorpha, pitcher, probably to to fact that it faces long stretch of lake.

That bare bank goes somewhat to SW. & is parallel to wind course.

A drain above SW.

The fringe of trees at (a) is on an elevated ridge evidently formed by lake. There is a small swamp west of this ridge

Some of the trees are dead at top - ~~Am. elm~~ & willow

at (b) there is a short (80 ft) bluff by lake, making bank 15 ft high. a cottonwood grows back of it.

The slope line below has scrubby straggling small trees (few) being in line with a drain to SW.

a cottonwood also stands in this at corner and but no doing fairly well.

above (b) & across head of lake the beach is sandy. From (b) down it is very bouldery.

Below (c) is short a sag with some border, & then a higher irregular bank runs along with larger trees (mostly cottonwood) below edge of bluff.

Along this border to
Equalizer I found:

Salix amygdaloides
cottonwood, Populus deltoides
Salix longifolia
Amorpha fruticosa.
Plum, Prunus am.
Red oak (bur) Quercus macrocarpa
Red elm, Ulmus fulva
chokecherry Prunus virginiana
Poison Ivy Rhus toxicodendron
Hackberry Celtis occ.
Hickory Carya ovata.

An attempt to grow boxelder & green ash on plain just W. of lake (to lake) is not very successful.

N. of sec. line a group of cottonwoods on bank 20 ft high, are protected by artificial gorge, mostly of soft maple.

This is at Estherville beach
Only a very few trees above along this part, & the bur oaks have lichen chiefly on E side
Below the elevated part on which Estherville Beach is located (it is cut off to west by swamp & low drain) there is a big swamp (acorns, etc) & its shores are treeless except for 1 partly dead cottonwood.
There is a clump of cottonwoods (4 trees) below S. end of Estherville Beach bank.
Opposite the acorns swamp There is a piece of sandy beach, behind the acorn swamp there is a big gorge of cottonwoods W. & willows nearer to river.
At (C) there is a small group of bur oaks, rein bow by planted soft maple, etc

The banks at & below
(c) again rise somewhat

On E side the soft
maples have more lichens.
The same is true of
a huckleberry (see lichens)
This is Eagle Point
Found another lichen
here
S & W, there is a
big cottonwood grove.
The cottonwoods near shore
have many lichens on
E side. (see lichens)
Small cedars probably
scattered about by
birds from old trees
set out.
South of big cottonwoods is
a grove of soft maples.
Rock lichens — again

chiefly on S side.
Just below grove the
slope to lake is gentle
& there is a low bank
a little below, a short
bluff, 18 ft (?) high
is cut off by little ridge.
Along here a more
fringe of trees appears
but a few straggling
low oaks appear on
slope above & below, —
the latter especially,
a short distance below
the bluffs are again
higher & there is a
dense fringe of trees,
with quite a grove on
slope

At (d) the bluff is higher
(near lake = 770 ~~800~~) & the
bur oaks come to top of
bluff & have lichens

on W side – here the exposed side, a thicket being on east.

The bluff runs, somewhat broken, to a point about 125 yds above the bottling works. It is fringed with trees & a couple of large oak groves run up in gentle slopes below the point marked (d). They are really two projections of the fringe.

In the space just above the bottling works there are very small springs, cottonwoods & willows, the banks being low & the slope to S.W. is gentle. There is an artificial grove, E. & W., S.W. of bottling works only – poplar, maple, ash, hackberry. This is W. cottonwoods. of the other grove S. of bottling works.

The cottonwoods just south of the bottling works are about 2 ft. in diam. & the smaller trees, open to the N., are covered with lichens on the N. side, – this time on light side again.

Aug. 1st 1913 (Fri.)

Went to bear of W. Lake.
Day fine & clear.
At N.E. "corner" of lake
the banks begin to rise
w a fringe of green ash,
basswood, shadbush, grape,
Plum, Am. elm. Salix amygdaloides
amoena, Salix discolor, Ostrya,
a small tamarack on top.
All else fringe below top.

Top of first steep bluff 735
Water edge. 690

The fringe, along lower bank
extends to opposite angle in
road & south the grove
widens abruptly.
A few straggling burr oaks appear
in angle W. of angle of road.
Small burr oaks E. of angle, exposed
all around, have lichens all
around trunks, - many on
exposed roots of burr oak on bank

In the dense grove south
I saw:

Quercus macro.
Pin oak (dominant)
Crataegus mollis
Rhus glabra.
Ostrya vir
Symphoricarpos orei.
~~Celastrus scandens~~
Prunus am
~~[illegible]~~
Cladrastis lutea (Prunus vir)
Crataegus (marcellus
(see spec)
Ilex am
Celtis occ.
Hamamelis virginiana
Viburnum prunifolium
Aesculus glabra
Rhus typhina
Rubus allegheniensis
Smilax herbacea
Prunus serotina
Zanthoxylum am.
Ulmus fulva
Gymnocladus (small)
Ostrya virginiana
Amphicarpa (smooth)

Rosa blanda
Ribes gracile
Aesculus am
Salix amygdaloides
Amelanchier
Ribes floridum
Aster Drummondi
Lonicera sempervirens
Apios tuberosa
Parthenocissus (Ampelopsis) quinquefolia
Celastrus scandens
Polygonum virginianum
Cornus florida
Cornus amomum
Fraxinus
Erythronium
Dicentra (bulb)
Lobelia virginica
Smilax herbacea
Podophyllum peltatum
Phryma
Thalictrum dioicum
Ulmus fulva
Cryptotaenia
Elymus striatus
Carex Albula
Carex amomum
Viburnum prunifolium (elevator)

Took lichen from Quercus & checking on shore at N. edge of woods (Lichens all around) See spec.
The banks to 1st pt. S. (4) are broken, 12-18 ft high.
Took lichen from Salix amygdaloides on shore -
Lichens all around
In rear of grove, on bank of ravine, finding up shells in box 1, at (f.) -
about 150 yds S. of wood the E. edge of timber, here nearly N. & S. is about 200 yds from lake shore (above 1st point).
The greater part (or about ½) of east bank is bare, with a few growing aspen. The smaller plants in this part are nearly all prairie plants,
about ½ rec line in sec 1 the distance from E. edge of grove to lake = 190 yds.

The timbered part in sec. 1 is rather broken by cross ravines, running E.

In ~~Sec.~~ 1. the part of grove on upland is everywhere practically tow oak + on ½ sec. line it runs more or less open, to lake bank, bluff 8–10 ft. high. Below the bank is a varied mixture

This extends S. of ½ sec. line.

Among these they are,

Desmodium canadense
Artemisia (Dis)
Yucca angustifolia
amorpha ericoides
Aster ericoides.
Zizia aurea
~~Helianthus~~ Silphium "-ifolium"
Artemisia ludoviciana
Helianthus scaberrimus
Symphoricarpos occidentalis
Solidago canadensis
Rhus glabra (small)
Allium canadense
Schizachyrium scoparium
Elymus canadensis

Antennaria campestris
Helianthus Hermi
Allium cernuum
Oxytropis lambertii
Hedeoma hispida
Ranunculus fascicularis

99–57

Among these prairie plants were found

Zapania virgin
Agrimonia eupatoria
Aquilegia canadensis
Geum album
Aster ptarmicoides

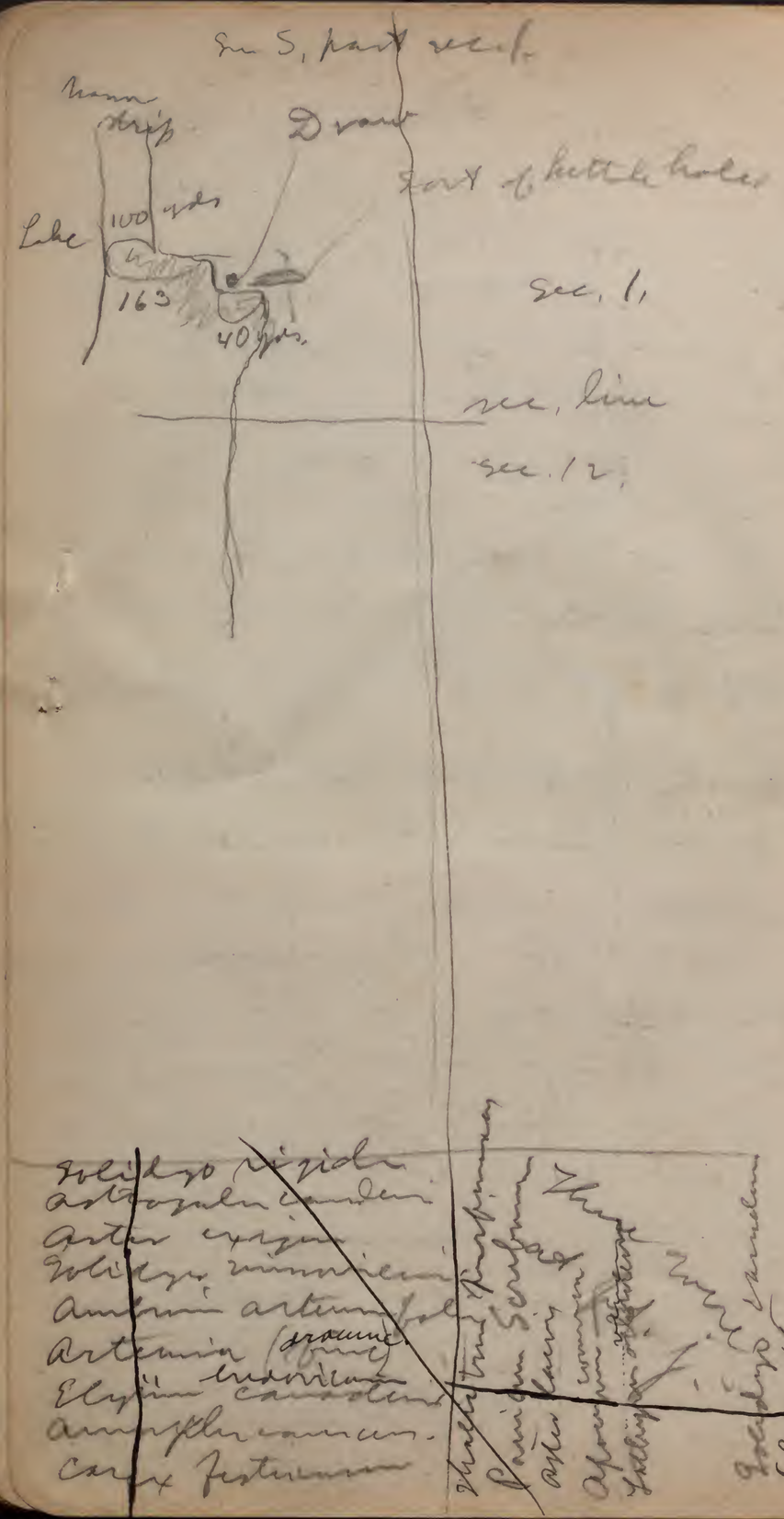
Opposite h the grove runs back only 45 yds to kettle hole, & then runs narrow about to ¼ ¼ line S.

h is a beaver dam, 708 / 682 / 26 ft.

All this narrow part is open upland tow oak woods

It seems to be merely opposite
(a little N) of Estherville bend.)
It forms a short abrupt headland.
The woods a little below almost
peter out & then widen abruptly.
On S. line of sec. 1 there is
a fine grove of bur oaks
over 2 ft. in diam.
Along the sec. line the edge
of grove is 300 yds from lake.
The yacht club point is just
N. of sec. line & it seems to
strike Eagle Pt.
The Greek temple is just
below section line on bluff
680 to 710 = 30 ft high.
Gymnocladus is near this &
may have been introduced
Young seedlings appear inbounds
Point (i) is Yacht Club point
& is above sec. line a little
From this point to Greek temple
shore is rather low but
rises more or less rapidly back

from S & SW. the Greek temple
ridge is a protection.
On ridge scant section red
elms are chief N. & west,
rip is here.
This is a ~~short~~ bluff which
runs with some interruption
almost to point j. where it
drops some, dropping a little
just below Greek temple
about ½ way between i & j.
The timber narrows to about
100 yds & is open beyond.
All along where deep
ravines come down, the
forest is dense.
The tops are more
xerophytic & either have
scattered bur oak (open)
or in places are prairie.
j is just below ¼ ¼ line
in sec. 12.
Several of these small springs occur
below Greek temple (in 1st ½ mile)
saw Andropogon scoparius
Desmodium canadense
Schizachyrium scoparium



To a little below ½ the first narrows to less than 100 yds. & then abruptly widens
this just above middle line of section 12
the high points at b. & c. are 20 ft (plus), Below b & town l the shore drops down a little lower, but banks still abrupt
along ½ sec. line first narrows back 130 yds from shore & just below that widens to nearly 100 yd more,
Below l. the banks are 12 to 20 ft high & there is a narrow belt of burr oak above bank
Below bank there is little. There burr oak face to S.W. & are the footprints of the first fortier north.

The "wooded portion" just above Haywards Bay is about highest
The whole shore to Haywards is bordered.
At Haywards sandy beach. Southward toward Haywards the belt runs 100 yds or so & is mostly very dense brush, - a few oak trees only appearing.
(Would this support extension under man's protection?)
The grove runs out just N. of head of Haywards Bay & the band runs down.
At head the slopes are low & slope back very gently.
The head is practically treeless,

Below Haywards the trees start in again in straggly fashion & the banks grow higher,
Saw the "Spondylos crypladii" grass of Tennessee park at Haywards on the sandy beach.
Just below extends out to wood, & a little beyond.

Trip to Center Lake.

At A there is an abrupt bank on W side of slough. Here is quite a grove, mostly brush.

The timber runs 350 yds S & SW. part of Center Lake for plants in woods see mix of page.

At Center Lake

Pinus strobus — Quercus rubra
Populus tremuloides — Sambucus nigra
Ribes gracile — Symphoricarpus vulgaris
Rubus parviflorus — Corylus rostrata
Corylus rostrata — Rosa nutkana
Parietaria pensylvanica — Ribes lacustre
Carex — Cornus
Cornus — Salix lucida
Salix — Populus balsamifera
Cirsium — Amelanchier
Cirsium — Amphicarpa monoica
Cannabis sativa — Agrimonia
Vicia — Verbena
Epilobium — Prunella vulgaris
Galium — Vicia americana
Lepiota — Fragaria
Nemophila — Ceanothus sorbifolius
Xanthoxylum — Cratægus (rubis)
Fraxinus — Amelanchier
Ribes — Hackberry (celtis occidentalis)
Red Elm — Ulmus americana

S.W. of lake there are hills & surface is broken.
N. & S.W. faces of outer knolls have no trees but walk & a couple of gulches cuts from outlets.

Top of next ridge (bare) = 730
Lake level = about 700?

At outlet by way of big slough there are no banks & no trees.
On N. & W. where grass are marked there are higher banks. There grass are not large.
The S.W. bay has a sandy beach with usual sand flora — Rumex maritimus, Potentilla pensylvanica etc.
Area W. & N. shows there are alternately sand & boulder beaches, the latter always in front of high banks. This

is the same everywhere along the lake.

Saw oak sprouts grows often on h. shore & pile a grove N.E. This is one that I have worked

S.E. side of lake shore boulders + gravel ridge – ice-shove

Stock stood on this in winter from N.W. to keep off bugs

a place nearly in woods with dead trees – trampled by cattle.

Collected shells under rotten log (bannock)

also slimemolds.

along road in sec 17 & 18 there are banks & ridges, & little lakes in the wooded part.

Returned to lake below Haywards Bay.

In the S.W. ¼ of S.W. ¼ of 18 the banks are about 10-15 ft high. All wood

Between m & n there are higher banks, cuts of ridges, & all along the banks are abrupt & beach looking.

Also timber all along.

In places over 20 ft. high.

712-956

Above here the country is quite rough & highest bank (bank) became about 44 ft. above water. Then rise eastward

At (n) highest point – 762

Drops just S. to 740

Runs along so for some distance ~~and then to here~~ ~~& then drops sharply~~

Water level 718

Just below the dam the bank became a little lower & ~~trees~~ strip narrower. Beach sandy & pebbly.

The roughest part is just above here & this also has heaviest forest.

Towards Mt. Ordze Dt. - no. 5.
the banks are high & abrupt & beach boulders,
Banks are timbered,
The woods E. of Dam are fine, undistributed, mostly Conifers.
Took fine lichen from branch.
1st settlable E. of Dam has no water in it. Took grass
Second has a small bog pond at N. end, & then a low plain extends S.
The pond has fringe of willows on S.E. side & another on W. side of lower low ground

At Obotoji 780 - top of hill back
725 - water
55

along W side Gor lake (middle)
The trees are mostly broadly, some green ash & some basswood - others scalloping
On W. side of middle Gor is a flat shore to lake - & slope back long & gradual, & no trees.
The banks on E. side of middle Gor are abrupt & quite high - steeper.
Those on W. side are high with interruptions, - and there is a higher ridge West & SW
See way for open place.
Again where banks = boulders
where flat = sand -
along flat on NE side of Lower Gor only a few straggling willows & cottonwood

A high bluff runs W. of lower gap lake & here pond is gone. The outlines are bare rock & this is evidently the dominant species excepting on lower part of middle gap where the green rock is abundant.

Level of lake = 730

Top of bluff W. of lower gap = 771.

The latter is a bowlder heap lower than hills west & small & pitching abruptly to lake.

Upper part of gap is fringed with sumac.

The gap W of brook is low & runs to hills.

N. & NW slope of lower gap is flat & thelm.

The lower hills near upper part of west side of middle gap are about 753

730

23

Still rises — 15–18 ft. high.

Top of higher ridge N.W. = 775

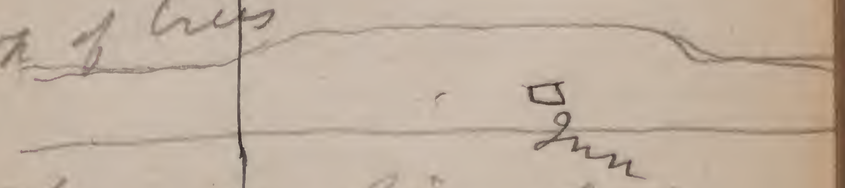
730

45

West of upper end.

RR = 755 at road intersection.

From lake a profile of the dam



The upper line shows top of trees; the ground near dam is higher.

Record of trips. 1913

W. side	E. Lake -	July 30 -	9¼ mi.
Arnold's Park to Lake -		" 31 -	15½ "
E. side W. Okoboji -	-	Aug. 1 -	14½ + 8 Parkers
Elm crest -	-	" 2	4
E. Lake - E. side -		" 3 -	14 + 6
W. side Spirit Lake -		" 4 -	17½ + 3
N. & E. " " "		" 5 -	14¾ +
			59½
			17
			106½

[illegible]

This mound is right on flat.
The other mound, W. of ditch is narrow at top, not flat, & irregular - some bits

There is a sort of terrace in the big bend, on E. side, higher than west, probably 20-30 ft above lower bottom.

In sec. 8 there is a sort of irregular terrace. ~~also~~ The hills here all have yellow loess.

On S. slope of last hill on east side of sec. 17 I could see blue loess near base of slope & more yellow loess on top.

N. slope also shows yellow loess below - iron tubes.

At center of S. side sec. 6 - 80-38 - on hill facing N. yellow loess appears on top, with many small nodules. The greater part of the slope, almost to last, shows blue loess with many iron tubes.

Occasional pieces of a fenestrate (?) appear but no Kansan is in sight.

Near S.W. cor. SE¼ of sec. 23 81-39 along road, which runs along northern slope, well below top of ridge, gravel & boulders indicate Kansan.

Copeland at Manilla is well digger

At little ridge in sec. 23 on White's land is almost Kansan. Yellow or reddish stuff - loveland? See sample.

toward river become less abrupt, and the road runs along flat.

Near Harlan found a patch of very low Amaranthus retroflexus. Vernonia is very bad in a bottomless pasture opposite.

618 In NW. Sec. 29-80-38 a cut on slope facing N. (not more than 3-5 ft. deep, shows Kansan in lower half, a ferretto zone, with a sort of chocolate layer above, & on this a blue (mottled) loess. (See samples)

The Kansan is of the gray modified type (see sample). The ferretto is clayey. The layer above (a foot or two?) is laminated, darker streaks interbedded & grades up into what looks almost like a gray loess.

Near top of hill, & on top, a layer of yellow loess (not thick - possibly only 4-5 ft) which at top shows small nodules, not very abundant.

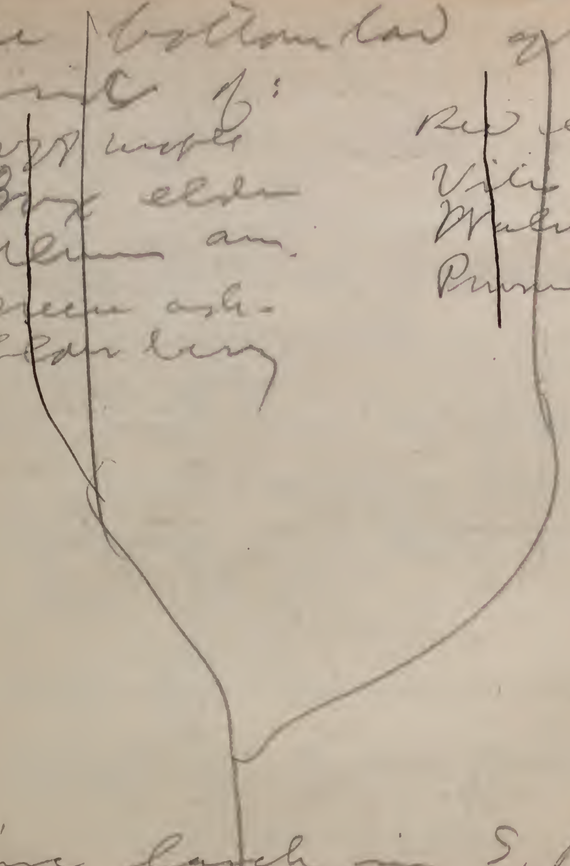
In NW. ¼ of sec. 29 there is a steep hill (facing N.) with cut. Yellow loess shows on top of hill.

The steep hill just N. of Pickard's (facing N.) shows calcareous Kansan (light blue) for nearly 2/3 of the way up. Above it an indefinite (slumped) reddish layer & above that yellow loess. Did not find blue loess - did not look for it. Looked at the two mounds near bridge - The greater mound is the east one. It is very flat on top & shaped: —

It is somewhat lower towards E. side.

The bottom land grows
consists of:

Box elder	Red elm
Ulmus am.	Vitis
Green ash.	Walnut
Elder berry	Prunus americana



Fine beach in S. part
S. of C. & N. W.
The mastodon tusk was
found just about where
1st telegraph pole N. of
S. end of E. side of cut 5
along C. & N. W. near
depot. (S.)

Aug. 17, 1913 - Sun.
Drove down Defiance with
Wilde
At NW. 1/4 1/4 of 8 - alog road in
a cut in loess.
This exposure, on S. facing slope, is
about 6-7 ft. up & only lower 2 or 3
ft. is clear. Rest overgrown
The lower part shows distinct
Kansan loess - few wodules, non
tubules non abundant, no fossils
visible
The upper part (smaller part)
shows a yellow loess, rather heavy,
with black streaks. No wodules or
fossils
Took sample of blue loess from
near base of slope, & of yellow loess
1/2 way up & in each case about
7 ft. below top of bank.
On N. slope - at corner another
similar section shows gray
loess at base, yellow above.
Three smaller cuts in yellow
loess appear north. This part,
to below middle line of sec. 8. is
rough, farther north the slopes

In the afternoon I walked out along C. & N. W. In E. side of first cut is where a Mastodon tusk was found. Said to have been in town. The cuts here are greatly overgrown with Unidentd alba, – a good holder!

Harlem station = 1200.

Down the track are the Springhead cement works. The raw is brought from the Platte in bul.

Over in sec. 20 on Sorenson's 40 – forest ~~[illegible]~~ red oak dominant. This was formerly full of Hazel bush, but now blue grass (finest pasture) The groves in sec. 20 were formerly all ~~[illegible]~~ cleared between – stumps alone.

Also found: ~~[illegible]~~

Symphoricarpos vulgaris
Ribes gracile
Sambucus (introduced?)
Celastrus ?
Xanthoxylum americanum
Ionoteum perfoliatum
Corylus americana
Celtis occidentalis ?
Crataegus mollis
Prunus americana
Rhus glabra (bush)

In the E. 40 the red oak is dominant.

This grove is on an almost N. slope.

The one south is also on a N.W. slope. I don't believe that the groves completely connected.

Aug. 13 - 1913 - Wed.

Left for Manilla at 5.55 am. Missed connection at Manilla and waited until 2:15 PM for freight. This took me to Manning just in time to miss the 3:40 PM. train for Harlan & I had to wait until about 9.00 PM. for a belated C. & Gr. W. Train.

Saw Miss Rogers at Manning. Reached Harlan after 10 & put up at Harlan Hotel. Very hot! Quiet!

Aug. 14, 1913 - Thurs.

Spent day in looking up well-diggers, working up plats, etc. Found Stephen out of town, but saw Ed. White.

Aug. 15, 1913 Fri.

Spent the day in work on township plats and in planning itinerary.

Aug. 16, 1913 - Sat.

Drove out in the forenoon with Ed White to the Baughn birchyard in sw. 8. 12. 7 town.

Found a thick layer of bluish gray loess, with many nodules, more or less in layers, and numerous iron tubules.

Where dry it is quite hard. A few shells were scattered all through. Found:

Succinea avara.

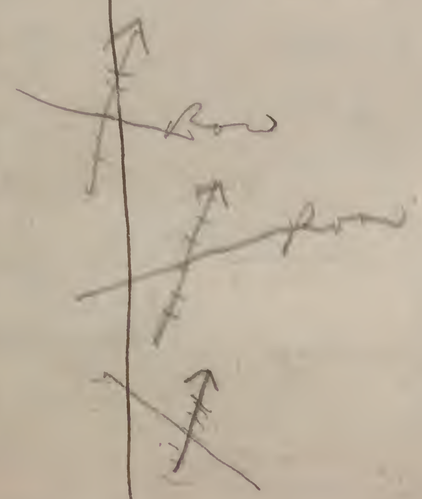
Followed up the river and saw what appears to be following succession:

Loess
Kansan
Aftonian → a
Nebraskan

Much water from (a).

Also found Suc. avara, Zonitoides, minuscules & Bifidum sonoriensis under heavy Study this in detail.

Auction low out,
" " "
then station Craig,
all the country to Craig
is undulating / Canyon.
Some distance out a long out

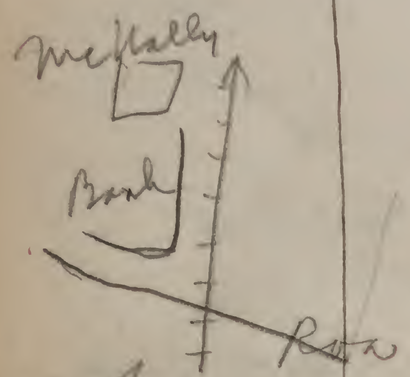


low long out.
From Craig in few mts
affew the RR. following
a valley.

Reached Sioux City at
6.10 pm went to West Hotel
& there met Dr. Stephens
& Mr. Smith, secretary of
the Sioux City academy of
Science. They had been
informed at the city office
of the C&NW that there was
no 6.10 pm. train (!) (I came
in on it!) and they
looked for me at the
C&NW.

Took supper at Dr. Stephens
home, with Mr. Smith, &
we then went evening
looking for shells from
Ohobaji region.
Rained a lot & in
wet I went back to
hotel at about 11.

then long cut with
drift (irregular line),
laminated deposit, &
S to find looking more uniform
(like Coles)



at McKelly a
long heavy bank
about depth.

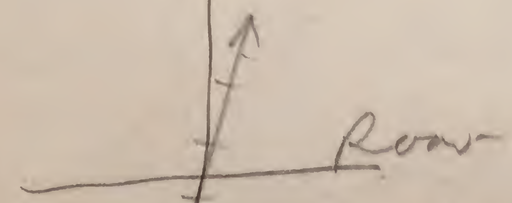
next -
Crone road

long cut - heavy -

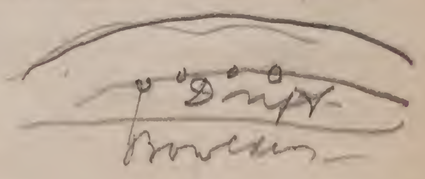
another long deep heavy
cut above & bouldery below -

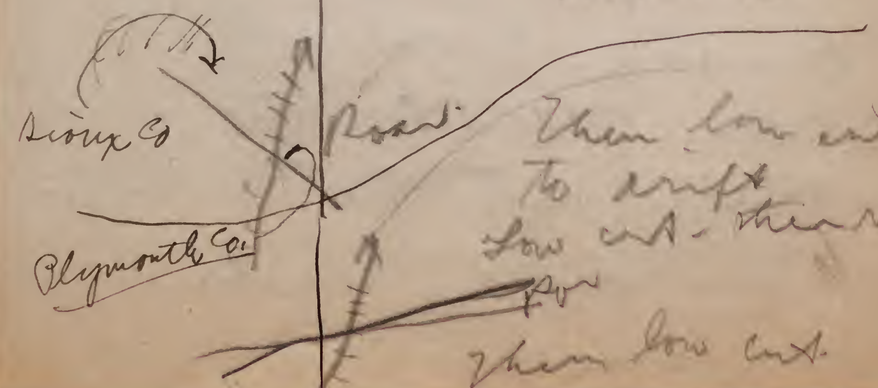
Country all the way undulating

Another cut - deep & long
heavy; above - drift below.
another low, heavy.
creek.



long cut - deep heavy above
& drift below - line between
= quite regular,
Another section long & deep cut a
little more irregular, for
both cases
convex.





then low cut
to drift
low cut - then road.
then low cut.

Visited until 4.20 pm.
Took dinner at Stone's.
Saw Merle Stone,
and found Ella
enjoying herself. She
has been on the Armstrong
farm about 3 miles up
the Big Sioux. The
farm borders the river.

A young man was
drowned just after dinner, &
as I was about to take
train his wife (with baby)
who was on a visit to
her parents returned. She
had been informed that they
were working with him, but did
not know that he was dead.
Her wails were heartrending
when she learned the truth.

Left at 4:20 pm, via
4V cut off line on C.M.W. for Sioux
City.

Along the line I noted
following cuts:

cut out of Hawarden on C&M.
after the long cut:
1 cut just where lines of RR
diverge.
cross creek. Then cuts low
down (may also visit)
Long, rather low cut
Another, deeper, showing
lamination, drift & upper
wash (parallel to road for a ways?)
Then cross road
Another long cut, - looks
nearly uniform.
Low cut
Another fair cut showing drift
& stuff above - with irregular
line of contact.
Crosses road
Another a short distance
beyond point

On return

no. 7 a =	902
~~no 7 =~~	~~890~~
no. 6 =	890
no. 5 =	900 (higher 8 ft. below bridge)
Top of Rock out =	888
no 4 =	886
no. 3 =	890 at hole
no. 2 =	did not re
no. 1 =	
Boots – no 1	873 in Spring
" 2	– 820 in small spring – in woods.
" 3	– 728 – On bank of bank under bass wood.
" 4	– 700 – On bank.
RR bridge	698

$8^2 \frac{640}{8}$

Spent night at Boots.

41

Aug. 12, 1913 – Tues.

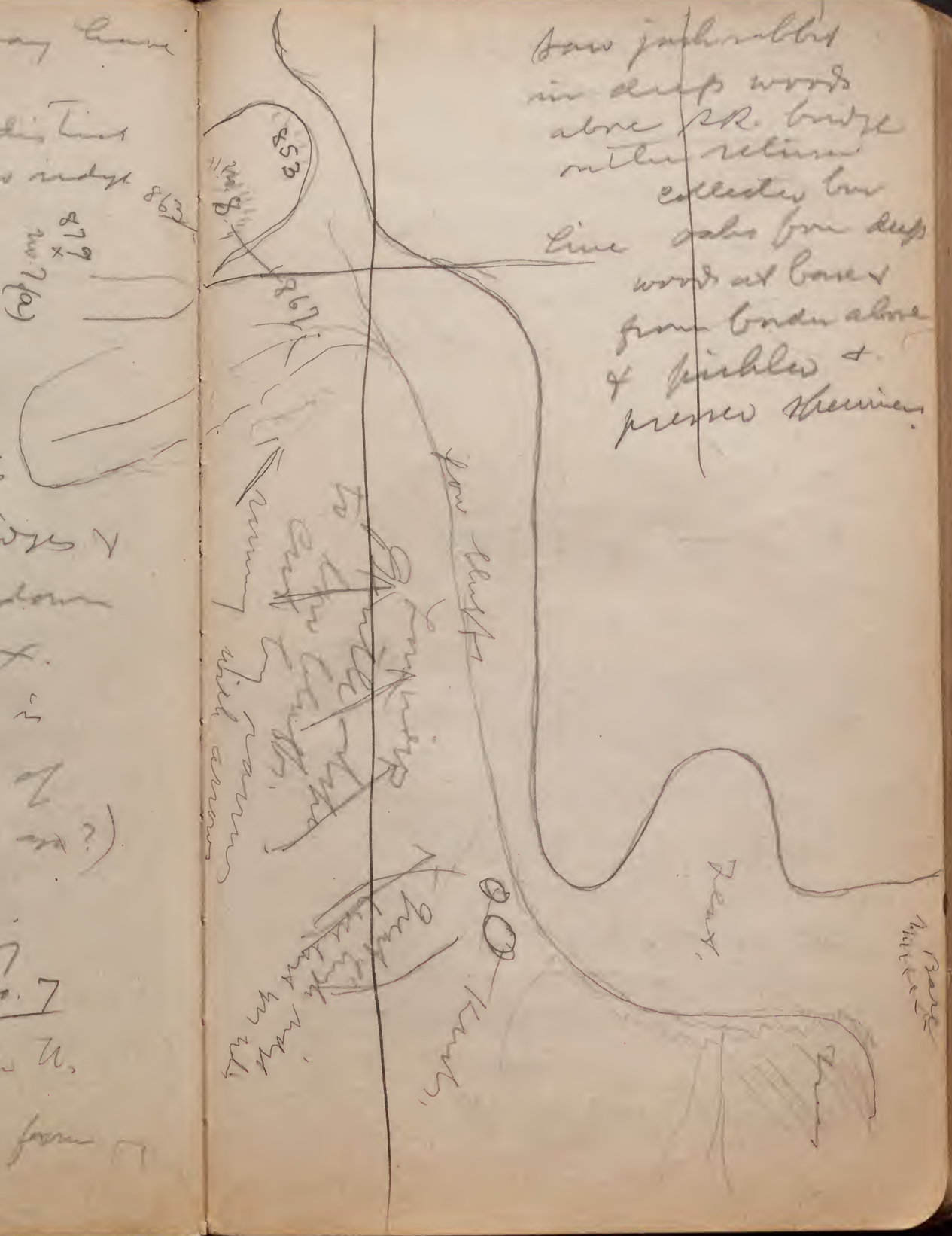
Expected to drive to mound but livery man went back on us. It was cloudy & not a suitable day for fishing. Gave it up and packed and wrote letters. Sent out package of plants collected on Boots in Lyon Co. & a alluvial prairie just above C. M. & St. P. bridge above Beloit Jct.

Left Canton at 10 am. and reached Hawarden at 10:45. Ella, Mr. & Mrs. Jack Armstrong, & Mr. Stone were at depot.

small, If grown, may have been cowed.
Nodules lacks in distinct at surface on north ridge toward No. 7.

Bank of 7 (5.) is a fair cut of corn.

E. from (7) (8) there is a sag cut by ridges & ravines running down to the Big Sioux.
On the E. side of it is the big, high ridge of last year (or 2 yrs. ago?) notes.
Photos 5 & 6 looking N.E. from near No. 7
Photo 10. looking farther N. from 9 near 8.
Photo 11 - looking N.E. from last point



Saw jackrabbit in deep woods above R.R. bridge on the return
Lime collected low down from deep woods at base & from bank above & pickled & pressed therein.

On ridges 3, 4 & 5, 7

Gnaphalium fl.	Aster plumosus fr.
Oxybaphus fl.	Linum sulcatum fl.
Cercocarpus fl.	Allium stellatum lv.
~~Eriogonum reniforme fl.~~	Penstemon gracile (?) fr.
~~(smooth)~~	Aster v. exiguus
Opuntia fragilis dry fr.	Arenaria peploides
Opuntia Cymbata do fr.	Lithospermum angustifolium fr.
Polygonum aviculare do fr.	Antennaria (modest 4?)
~~Rhus aromatica lvs.~~	Mimulus alba fl.
Rhus glabra fl.	Angelica ? lvs.
Silphium laciniatum fl. bl	Verbena bracteata fr.
Monarda ~~stipitata~~ fl.	Amelanchier fr.
" bicolor fl.	Aphonopappus ? lvs.
" ~~slightly fl.~~	~~Aphonopappus ? lvs.~~
Aquilegia cylindica fr.	Gnaphalium margin fl
Lithospermum ~~canescens~~ lvs	gram
Lithospermum scouleri lvs	~~Petalella argute~~
Petalella mandelium fr.	Aquilegia
~~Zauschneria~~	~~Petalella argute~~
~~Lithospermum fl.~~	Aquilegia bicolor
~~Polygonum mandelium fl.~~	Astragalus fl
" neomexicanum lvs	~~Astragalus fl~~
" rigidum lvs	~~Astragalus fr~~
Eriogonum ramosum fr	Lithospermum canescens fr
Petalostemon purpureum fr	Lithospermum canescens fr
Rhus aromatica candidum fr.	Aquilegia fr
Rhus aromatica angustifolium fr.	Aquilegia fr
Aster oblongifolius fr. fl.	Aquilegia canadensis fr
Whole Blue grass (same as	Lithospermum fr.
as granite)	Aquilegia canadensis
Ceanothus (americanus ?) lvs	Lithospermum fr.
Gentiana serrata fl	Aster laevis lvs
Prenanthes asperum lvs	Gilia aggregata fr
Panicum capillare fl	Antennaria arenaria fl
Aster sericeus lvs	Agoseris gracilis fl.
~~Astragalus fr. (mull)~~	~~Lithospermum fr.~~
Coreopsis palmata fr	Helianthus lanceolatus fl
Phaseolus vulgaris fr	Heliomeris multiflora
Psoralea hypogaea lvs	

Below pt. 5 (863 / 850 / 13 feet) there is a bank about 2 ft. running down hill along row. 9A shows upper 6–8 in of dark stuff (like (4?)) & below that 1½ ft. of blue loess, streaked with rusty, with iron tubes & nodules (see stake), No. Only this in part Kansas loess.

No. 5 = 863

From 5 – S.E. there extend a high broken plain, the bluffs are not quite vertically higher.

The bank N.E. of Canton is about as level with (5), Nodular loess is visible on surface above cut & near (5).

No. 6 –

No. 7 = 868.

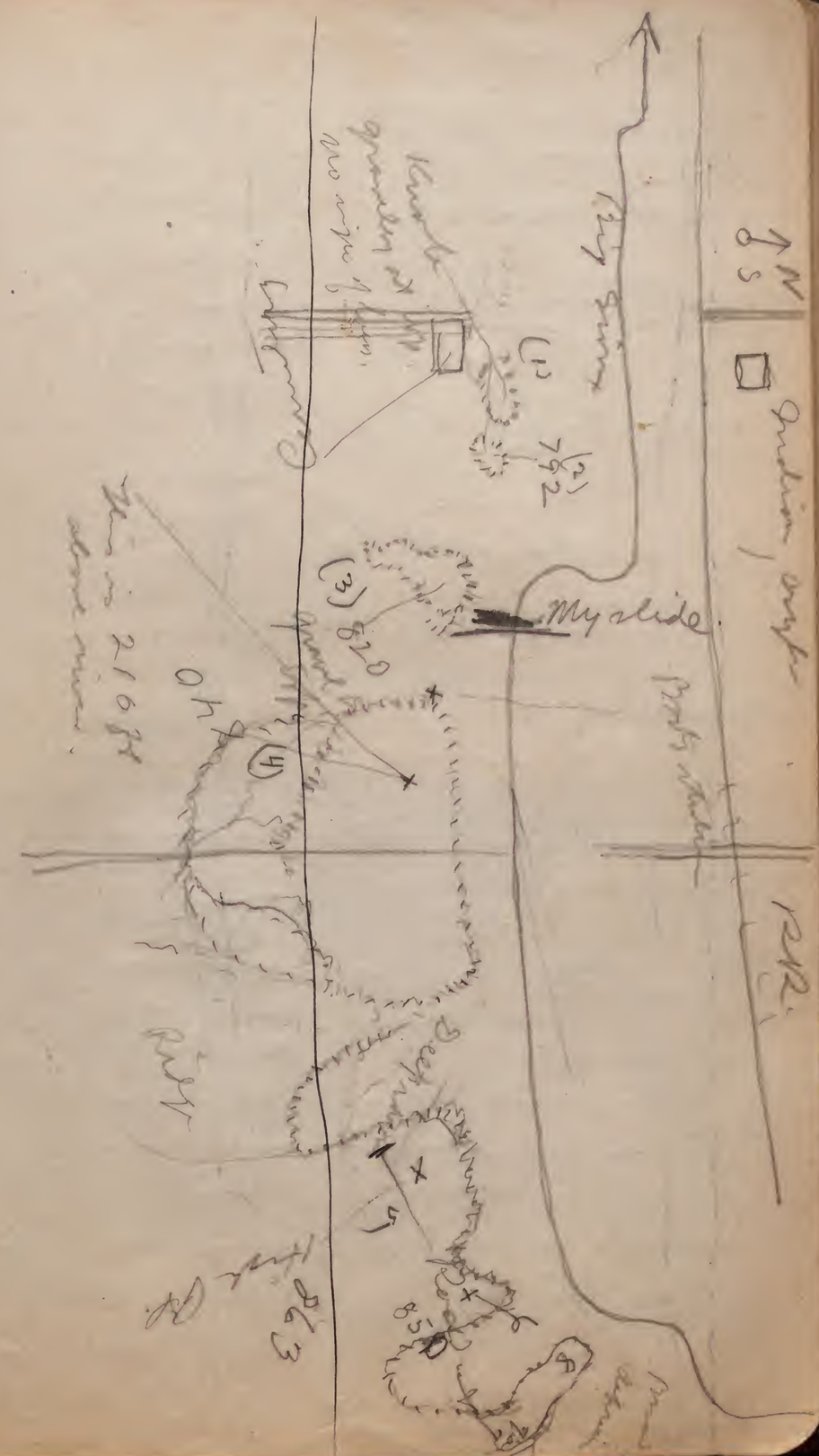
No. 8 = 858

The ridge from 7 to 8 is narrow timbered slopes (especially E.) & bare on top, with boulders & pebbles just below 8. A little cap of loess at 8 – very

On alluvial prairie (on bench)
~SE of RR bridge - on Iowa side)

Andropogon furcatus
Bouteloua curtipendula
Verbena angustifolia
Petalostemum candidum
Artemisia ludoviciana
Rosa (same as prev rose at Edwards)
Kuhnia [illegible]
Elymus canadensis
Silphium laciniatum
" perfoliatum
Helianthus scaberrimus
Solidago serotina
" missouriensis (larger)
Symphoricarpos vulgaris
Liatris scariosa (bud) Fl.
Monarda mollis
Heliopsis scabra
Brauneria angustifolia
Silene stellata
Rumex altissimus
Anemone canadensis ?
Equisetum hyemale "
Physalis virginiana
Agropyron Smithii (1 spot)
Aster v. exiguus
Erigeron ramosus ?
Cirsium arvense (?)
Sorghastrum nutans
Linum sulcatum
Oenothera [illegible]

Potentilla arguta
Onosmodium occidentale
Carex festucacea
Solidago Virgaurea
Lithospermum angustifolium
35 Lepachys pinnata
Panicum virgatum
Verbena stricta
Asclepias verticillata
Euphorbia marginata
40 - Polygonum convolvulus



Mt. towards the
Beaver Cr
surface is much
rougher
Down towards Canton
these undulations
& low draws continue

Bert's station at	(5)	842	(837) (826)
"	(2)	770	(760)
"	(3)	676	(670)
"	(4)	640	

these readings were taken Monday.

Rainy in afternoon and I spent it at Bert's house, writing letters, etc

Aug. 11, Mon. 1913

Met in forenoon. After dinner went up to Bert's station & worked on hills on Iowa side along the Big Sioux

At Canton -
RR. - 662 (?)

Down end of bridge 655
About level of bench on Iowa side, & on Canton side.
River at bridge 631
Took elevation of hills on S. side of Big Sioux.

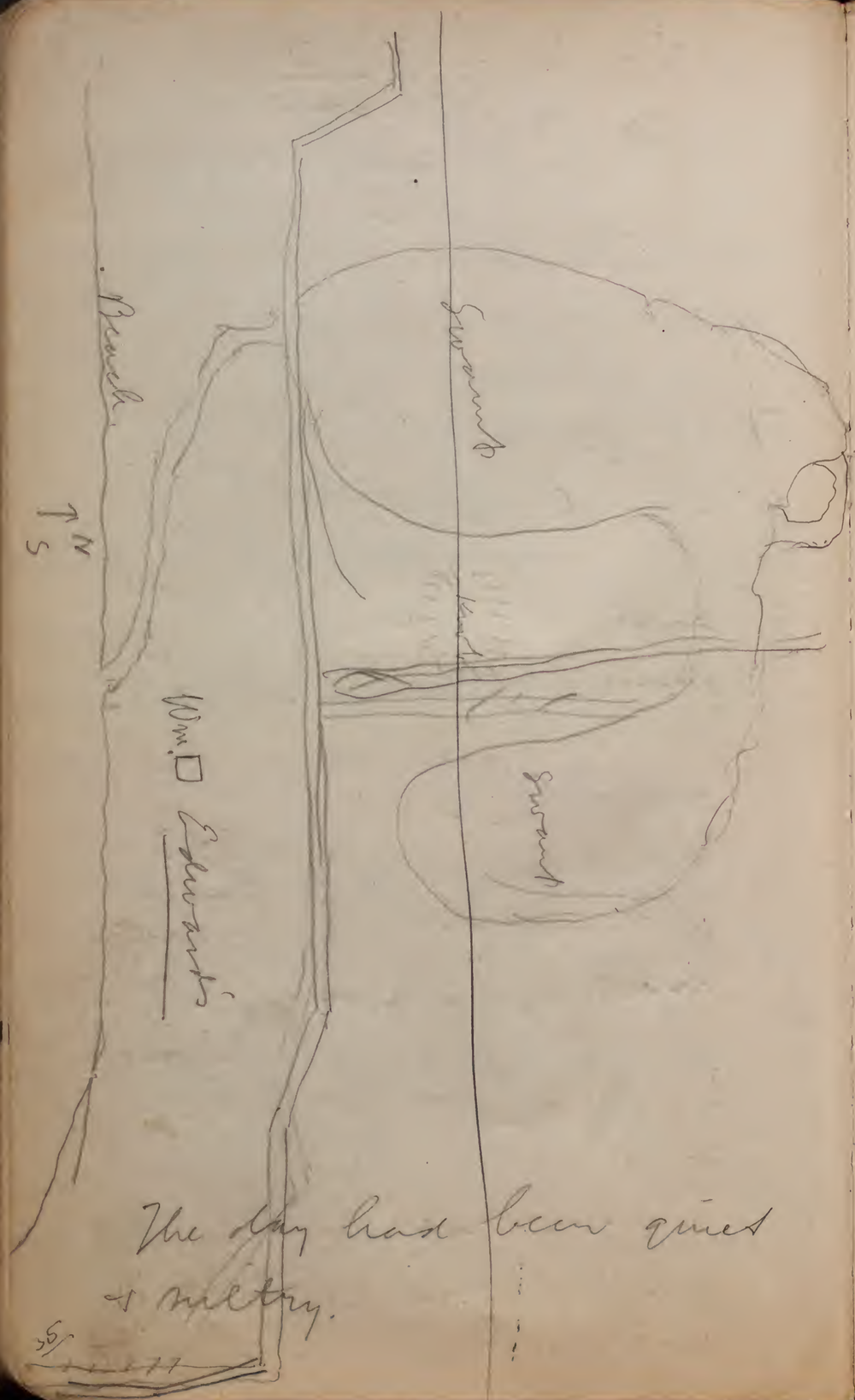
1 = [illegible]		gravelly to top.
2 = 792		
3 = 820		
4 = 840 -		

On no 4 there is a coal. I dug in about 1½ in. & took sample. It is bituminous & not like lower

Aug. 10, 1913 - Sunday

A gloomy, cloudy forenoon
threatening rain.
Wrote letters, etc.
At 1 PM. left for Canton.
Country rough to S. line of
county. Then by gradual slope
& long draws to S. E. & S.
the surface drops. There
are elevations (rounded & rather
low) between these draws
that make surface undulating
Only a few swamps.
Southward toward Harrisburg
the plain is somewhat
flatter but shows very
little evidence of ~~xxxx~~ drained
places.
Northward from Harrisburg
this plain extends in
gentle undulations
Eastward all along the
surface is more undulating.

S (& E.) of Harrisburg
there are long shallow
draws leading S.E.
and S.W. & W. The
plain is gently
undulating, with
shallow draws leading
S. or possibly somewhat
S.W.
Very little evidence of
undrained places appears
here as there are small
creek like drainage
channels.
Plant life on this
plain gives no evidence
of swampy conditions
almost any where.
Canton the surface is
again more undulating & the draws
more pronounced.
Very few small undrained
places anywhere.



The day had been quiet & sultry.

35

Aug. 9 - 1917 - Saturday

Arise at 5 a.m.
At lake level 1050
Wt of 1st level E 1135
of Edwards

Hens to Granite — V
worker in tretz wire
excellent plants
Extra room a fine
Elevator magnificent. Took
steer.
Worker west side of Big Sioux
river. Found alluvial bank
with shells (mussels)
also dredged in small
pond at 3/4 mile past W.
found no granite, but found nothing
living except Plan farms
on banks of yellow Pond Lily.
The pond is full of lilies &
many are in erect petals
an mud.
Got wet.
Left at 9.20 p.m. for Sioux
Falls. Put up at the
Zeem Hotel, - the old Dacotah
House.

Pinkus up
hymn &
sec. retain
flat.

Avenue grades,
Plain, 3-rolls &
on North bay

All along NE & E. side
the banks are abrupt,
irregular & high,
Blue grass in all of NE grove,

The NE
strangely
grove,
cut.

outer part is
tree-crab open
but a good many

The 2 slopes join
at N.

N. of RR. a large
double lake connects
W. of
The W. side (& S. of W.
lake) is rough, knobby
somewhat, & the banks
and higher places
are covered with low
brush trees chiefly

34

The ridge S. of mouth
in SW
in which
locates,

cor. of Twp
Spirit Lake is
is 1130 paces
1143 rods
15

Run 10-15 ft.
Slopes are rather
abrupt
sides &

on both S & N
both are timber.

Twp has openings in woods
Practically all bowlders

collected
RR in

stones in piles S. of
sec. 6. - lower
point of west lobe of
lake.

These lakes were
evidently all connected.

and islands of prairie in the fields.

W. side Center Lake –
Top of bank 1110
Water 1094
16

The banks are abrupt, beach boulders.
Bowlders run out on flatter bank, but a knob rises 8-10 ft. higher to S.E.
above this grove a boulder ice-shove ridge. 4-5 ft high. Fine.

On N. shore (west) a high bank, 1117, is abrupt & has good fringe of bur oak with a few green ash. Some on top. Some American elm, Vitis, Ostrya,

Eastward the bank are lower & on the flat alone (sheltered by higher ridge to S. & SW) there are a few scattered bur oaks.
A fringe of cottonwood, willow, green ash, Am. elm. extends eastward on isthmus between N. bay (or slough) of Center Lake.
A high boulder ice-shove ridge all along upper shore.
Toward straits there are scattered bur oaks.
Between 2 sloughs of N. is a ridge 5-6 ft. high with a grove of bur oak & a few green ash. Rubus grandis (Xanthoxylon am. on point west to lake)
East from slough the banks are high (extending 20 ft) & covered with a broader grove of bur oak, &c

2nd row

Kalmia	cristata fr.
Bouteloua	hirsuta fl.
allium	canadense bulb
Oxybaphus	floribundus fr.
Kuhnia	eupatorioides fl.
Prunella	vulgaris var. albiflora (?) fl.
Aristida	basiramea (?) fl.
Andropogon	scoparius fl.
Linum	sulcatum fr.
Oenothera	rennelata fl.
Silene	antirrhina fr.

On flat below ridge

Eryngium	astragalus canadensis
Artemisia	Vicia virginiana
circinnatum	Desmodium nudiflorum
Prenanthes	Panicum virgatum
crepidinea	
Solidago	canadensis
Andropogon	scoparius
Kuhnia	eupatorioides
Aster	linariifolius
Astragalus	canadensis
Penstemon	

2nd knob east = 1145

Lake S. = 1094

SW 1/4 Sec. 1 — This lake is surrounded by banks. Lowest drains at N. & S. end

Trees on S.E. banks

Banks S.E. to top of knob 1096-1123

The grove on S.E. is open, mostly Juniper — a few vitis, Crataegus mollis, Prunus nigra, Aster chelonias, Viburnum lentago fr. Ribes floridum, Ampelopsis, Rhus,

In grove:

	also
Cryptotaenia	Rubus hispidus
Phryma	Vallenia
Kalmia angustifolia	Zanthoxylum
Geum album	

In the part (all around) there are boulder plains on the ridges which the farmers do not cultivate. Hence you may see tongues

The ~~height~~ top of stats is just about on top of bank & represents the height of bank along lab. & Beals further down the banks are lower - at Smiths'.

The marks 10, are much open than rest.

The second opening between Manhattan & Equalhave is right below the Equalhave grove.

The first is nearly 1/2 way down

31

Aug. 8, 1913 Friday

Rower & friend of Earle & went up at Edwards', walked east -

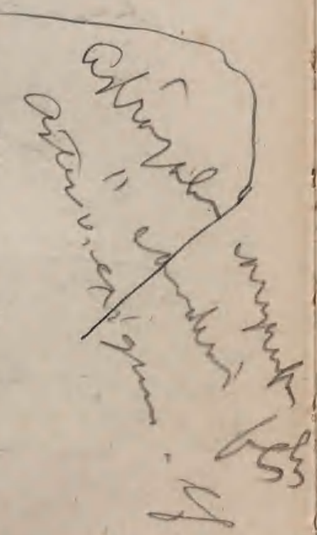
On high more E. of Edwards -

aeschynomene virginica - fl.
aster ptarmicoides - fl.
Solidago rugosa - fl.
Stipa spartea - fr.
Amorpha fruticosa - bu.
Solidago nemoralis - fl.
Verbena stricta - fl.
Helianthus scabrus - fl.
Liatris scariosa - bu.
aster ~~multiflorus~~ - bu.
" oblongifolius - bu.
Solidago rigida - fl.
hypoxis erecta - fl.
Brauneria angustifolia
coreopsis tinctoria, bu.
Amorpha canescens - fl.
Castilleja coccinea - fr.
Baptisia australis - fr.
Petalostemum purpureum - bu.
" candidum - fl. (bu.)
Oxytropis lambertii - fr.
aster ericoides. bu.
Solidago m. angustifolia bu.
aster laevis. bu.
Anemone cylindrica

Compare - Amorpha pattern

Found 2 Phlox filiformis
— flower on west side of
sec. 22 in low ground.
Going N. along W. line
of sec 22 & another
mile north I saw.

Amorpha canescens fr. & fl.
~~Lespedeza hirta fl.~~
Liatris spicata (brown) fl
" scariosa bw
Lobelia spicata fl.
Parnassia grandifolia fl.
" caroliniana fl.
Solidago rigida lf.
" nemoralis fl
" nemoralis fl
Allium stellatum bw
Brauneria angustifolia old & infl.
Aster pilosus cordifolius fl.
" novae-angliae lf.
Asclepias tuberosa bw
" syriaca lf.
Pentstemon antirrhinoides fr.
Stipa spartea old
Andropogon furcatus fl
Elymus canadensis fl.
Rosa fr
Crataegus pulcherrima fr.
30// Anemone cylindrica fr
Lathyrus venosus lf



Pelalostemon purpureus fl
" candidus fl.
Koeleria cristata
Kuhnia v. corymbosa - fl. & bw.
Phlox pilosa fr. & fl.
Cirsium romanum fl.
" lanceolatum fl.
Erigeron canadensis - bw & fl.
Amorpha nana - fl & fr
Helianthus scabrus - fl & fr
Lespedeza capitata fl & fr
Artemisia ludoviciana - bw
Prenanthes asperula - fl.
In lower place
Spartina
Solidago canadensis
Sphenopholis obtusata - old
Helianthus grosseserratus - fl. & bw

Hill in NE. cor. of sec. 16 = 1250
Swamp East of it = 1215
High school hill = 1238
Swamp in NE. ¼. NW. ¼
sec. 27 - 99 - 37 = 1158

On return in evening
reading on top of steps
was 1123.
1097
26 feet difference

Usual Potamogeton zosteraefolia, some Ceratophyllum, Ranunculus trichophyllus.

"1763
"69

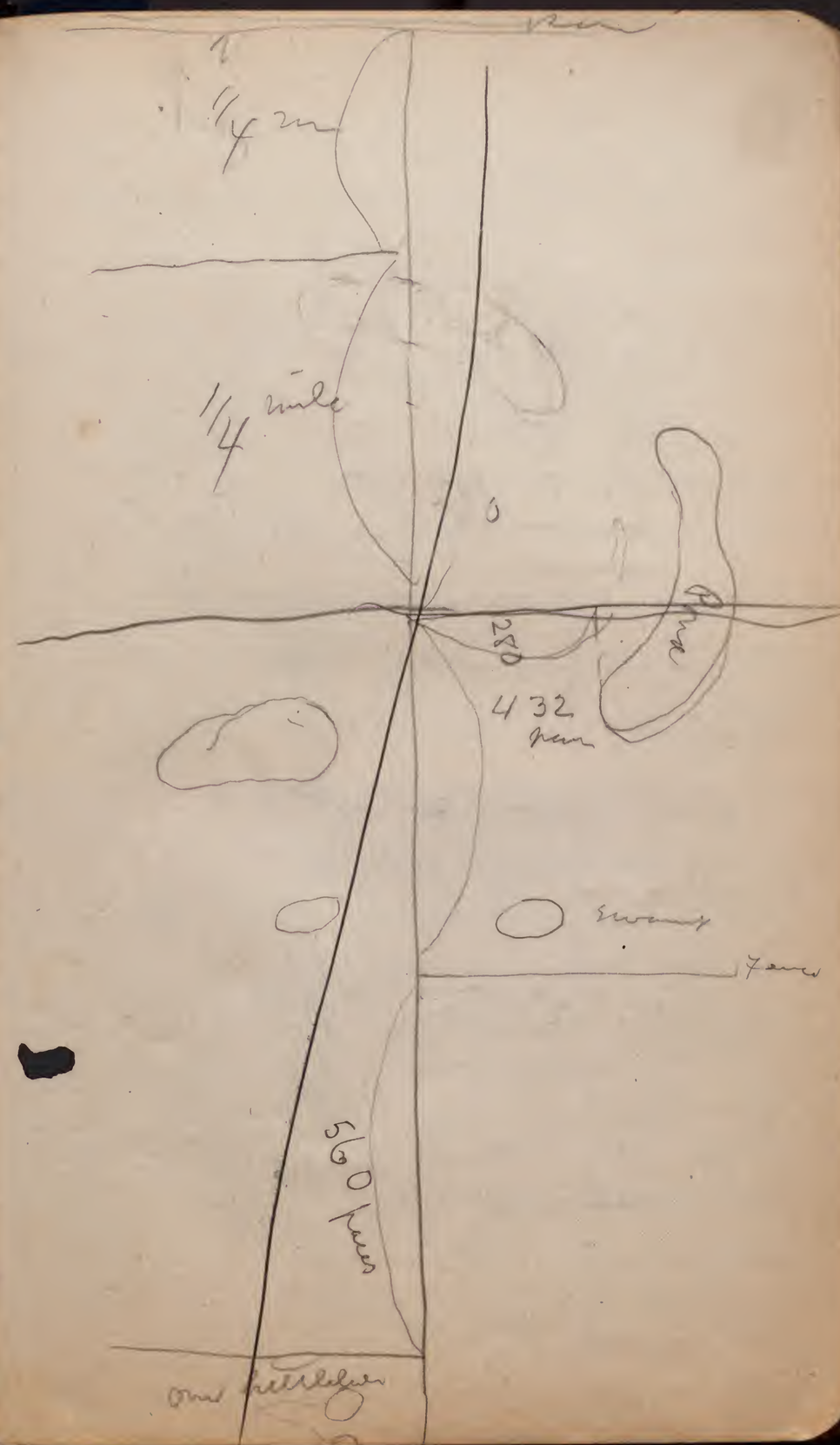
Aug. 7, 1913 Thurs.

Remained at Lab. and packed, pressed plants, worked on maps, etc. in forenoon.

afternoon went west.

Readings:

Lake level	1075
Top of steps	1097
My cloth stakes 2 -	1098 - 1120
At road	1130
Top of Lake level	1174
to bottom of kettlehole on W.	1187 - 1145 = 42



Aug. 6, 1913 Wed.

Went from camp at Lake.
Afternoon rowed to
Cove, Snell Pt. & Eagle Pt.,
took photos of Cove looking
N. — 15 & 16.
also snap shot no. 3
no 4 = Ice blue sand
ridge on Snell Pt. — looking
East.
no. 33 — along ridge
34 — sandy site (Cove)

In bay just at E entrance to canal
found Potamogeton Richardsii
" amplifolius
" zosteraefolius
" natans (very abundant)
" pectinatus

in bay.

Naias flexilis — lvs.
Elodea —
Ranunculus trichophyllus — fl.
In the big swamp at Y in camp
there is much Myriophyllum
spicatum in flower. Also

There is an abrupt bank all along S. side of bay & to point in sec. 3. There is a narrow belt of timber.

At other end of E. Obobiji the bank extends with some interruption for about 200 yds above and in bend. The N. the plane is flat & no trees except a few small willows. Right at the angle there is a little bay & no trees. Below angle (in the turn of road) the scant timber grove is semi fenced by cottonwoods

a few decs cottonwood.
A bank 2. pm XXII
has grove of green ash.
Below XXII for 1/4 mi it
is flat & only a few
scattered willows, green
ash & cottonwoods &
below some cottonwoods.
~~Then a higher bank~~

Two large potholes
of verdure holds
tools possession of
the 2 pastures.
Then a bank at first about
12 ft high, then 6-8.
Between it & lake a
straggling line of generally
weeping asp & few bur oaks
There become more abundant,
especially bur oaks, as the
bank rises toward XXIII.
Quaking asp is also common here.

94 ⊃ lake
96 ⊃ Bank at XXIII

The grove runs back
on top line for 75 yds &
there are bur oaks
scattered & ash
Runs along at about
this height, rising to 25
ft toward angle in road, & the
grove runs up on bank,
especially where sag seen.
Beyond road the strip
is narrower.
A drop in bluff a little
below angle & then rise
to about same, then
again a drop to less
than 20 ft. Trees of
woods about same width
just a little on top of bank.
The banks run along 15-
20 ft. & have chiefly bur oaks
on slope, with few on top.
This has been reinforced all
along (as indicated on plat) by
4-5 rows of soft maples.

S. Jenkins keeps boats at the wood angle.
The swamp back of his place connects with lake by stream.

960 – top of bank
933 – water line
27

Below Jenkins the banks become higher and there is a grove of big cottonwoods & willows evidently artificial.

All around this S.E. part of E. bay there are many elm trees at margin of woody border, – mostly cottonwoods.

Below this the ~~banks~~ drop down & there is a broader natural, swampy belt with pop, cottonwoods below bank & on top

25

low oak & some green ash.
Back of it (S) a swamp.
The S. border of East Bay is low & has only a fringe of cottonwood & willow, many of the former dead.
Westward towards Big Stony Point (no. XXI) the banks become higher, 6–12 ft & the grove is done, some young ash thickets & a few elm thickets are on S. side.
The trees are low oak, green ash, plum, chokecherry, am. elm, cottonwood – many dead – all near lake.
Towards Big Stony Pt the back drop of the point is flat with only straggling ash, willow, cottonwood, + big sprawling ash.
Below XXI there is another bank back from lake, well timbered.
Then to XXII a flat with only straggling willow & green ash & on to XII

Rock lichen on large granite boulders
covers top
At XVI the bank rises very abruptly
to nearly 20 ft. Only few trees
occur
At XVII it is about 20, and there
is an artificial ~~soft~~ maple
grove
Native trees almost none between
XVII and XVIII & few between
XVI & XVII.

XVII - XVIII are above to XIX
the shores are quite flat.
At XIX a group of cottages. Here
a causeway separates a pond from
the lake. It has only a few willows
at west end.
All the N. shore to NE. corner
(to road) is flat and mostly treless
except for a group of willow (S. among &
green ash in the N½ of NE. ¼ of
sec. 11
There are also willows & some green
ash on point in NE¼ SE¼ sec. 11
No. 11
South from the point the beach is
bouldery & there are abrupt banks
with a mere fringe of greenash,

cottonwood,
Outliers of small bur oaks
run up the slope above
bank.
Brambly - estimate 8-12 ft.
Chokecherry Ar. Elm
Vitis Plum
Blue gentian
Bur oak
Greenash
Cottonwood
Hairy Ramanta (cows) on
flat shore.
~~The~~ belt runs out into
green ash, cottonwood &
Am. Elm.
On the open sandy beach
fragments of small Anodonta
and Unio latissimus (shells)
abundant along shore,
But to angle in road in sec. 14
the beach is almost bare.
Only a rare willow.
Near angle there are more
willows & some ash, but most
of these have grown up quite
recently, so keeper of "sandbar bridge" says

nearly all am. elm &
box elder.
All along in front of
Sampson's & far east there
is a fine ~~ice~~ shore sand
ridge - 2 - ~~1 ft~~ high &
within it, especially in
front of Sampson's, a lower
ridge of grave, - making
a double ice shove ridge, - or
2 ridges about a rod apart.
But counted the rings in
a cottonwood stump, 20 in
in diam., in front of Sampson's
Lodge, a recent shove,
and found 115 rings.

There ice-shove ridges
show farther east, the
inner large
Really a fourth small
one
Not true map shows
of them.

Same principle as in
tree growth is illustrated
here. The south side
of the two larger outer
(next the lake) ridges are
bare & the N. side is
partly covered with growth.
mostly Russian thistle

(Pt. XV is at place where there
is an elevation & steep banks &
narrow strip of timber - with bare
place E. of road)

Pt. XVI marks the W. side of
East Bay.
up to this point the elm, ash,
hackberry & box elder hold the
foot & form a strip from 25 to
100 yds wide
The large lake N. was once
connected with main lake.

At XVI are many boulders &
all along there is a boulder ridge,
an old ice-shove ridge.
A bank of 10 ft. extends E. of
Point XVI.

Aug. 5 - Tues 1913

Spent night at Crandall's Lodge. Met Mr. & Mrs. Schoentgen.

Started at 7.30 across E. side of lake.

collected plants on sandy beach on S. side of N. Bay. E. of Crandall's Lodge.

Dredges dead shells along dam E. of Crandall's - see box

Found larva of Caddis fly (Valvata) -

collected a few aquatic plant.

The point from Crandall's to dam has a fringe of am. elm, willow (S. amyg) & a cottonwood & two. A few green ash. The elms & ash are battered.

On S. E. side of N. Bay there is an elevated ridge (rise 10-12 ft above water)

with a good grove - of

Basswood	Chokecherry
am. elm	Vitis
Hackberry	Buckthorn (small)
Ribes	Sedges
Elderberry (very common)	Green ash (bar)
Columbine	Very few trees only
Ampelopsis virgin	monospermum
Acer album	Plum
Black ash	Butternut
S. amyg	Crataegus mollis
Rubus flagellaris	Cambodia hybrid
Green elder	are dormant
Am. elm & Hackberry	
next - green ash.	

Much cutting in this grove. collected a Vaviloxa, Polyphemus, & some land shells.

The grove is fully 200 yds wide E. of N. Bay & then tapers to less than 100 yds beyond the old Sampson Lodge. E. of Sampson's the grove is

At the s. end of west lobe of Little Spirit there is a bank 7-8 ft high but no trees except a fringe of old leaning willows near shore

This west lobe is shallow & marsh - some clear water near state line.

On W side on low point is a grove evidently lately willows

The artificial part of grove W of E. lobe is cottonwood, green ash, Am. elm, Boxelder,

Robinson Lake is now also called Kettleson Lake.

Sunken Lake connects with Hollies Lakes

Sunken Lake (the little lake between Hollies & Marble Lakes, is asserted (by the owner of Crandall's Lodge - a son-in-law of Crandall?) to have been formerly within the memory of man.

Mr. Nestor(?), son-in-law of Crandall (who died 3 yrs ago) says that groves have not increased in area since first settled, but that undergrowth is denser,

Both the lower lobes of Little Spirit Lake in Iowa are shallow, overgrown, and present that marsh aspect so common in the shallow lakes of the whole region. The upper part is said to be 15 or 18 ft. deep and shows clear water. This part is chiefly if not wholly in Minnesota. The region W. & SW. of these lakes in Open Prairie & the slopes down to lake are long and rather gentle. It must be remembered that in all places where there are banks along the lakes they are variable in height, usually running in a series of loops or curves, sometimes quite irregular. When altitudes are given they usually represent highest points, or levels of longer stretches that seem to be nearly horizontal.

There is one consistent fact, however, namely that trees appear only where there is a bank, or elevation, to start them. After once started they can rise above the level of their protection.

Very few banks which would shelter from the S.W. or NE. are without trees. In these cases probably an "accident of distribution".

It is interesting to note, too, that steep banks will protect for a very short distance even on the windward side.

The lower part (SW) of Hotten lake = Robinson lake.

The ridge between Robinson & Marble lakes runs away also between Marble & Hotten lake & there begins about 25 ft high, abrupt on both sides & flat on top - All hardwood.

In the place marked "swamp" between Hotten & Marble lakes there is a sag across practically connecting the lakes. They were evidently once so connected

Saw 2 or 3 pinnate Verbena hastata

There is also a sag at N.E. end of Marble lake, grass & swamp, few trees - green ash

Another sag E. to S.W. - all dried lands & woods

The ridge between Hotten & Marble rises to 35 ft

Crawford's
after supper.

W. side of lower lobe of Little Shint Lake has high banks again & is densely wooded, equally as being abundant.

Across causway no trees.

Above it is low, only a low ridge with willows, cottonwood, elm.

Banks on S. side of this lobe are also high (abrupt) & wooded.

Across Little Shint Lake

Black ash
Basswood
Am. Elm.
Green Ash
Amelanchier
Plum

Swamp Plants - Marble Lake

Cephalanthus perfoliatus
Smilax pseudo aberrans
Zanthoxylum verrucosum
Sambucus canadensis
Spiraea salicifolia
Lycopus sinuatus
Juncus tenuis
Carex vulpinoidea
Asclepias incarnata
Rudbeckia fruticosa (large purple having at top)
Asclepias canadensis.
Pentstemon serrulatus
~~Acorus calamus~~
Heteranthera
Sagittaria califolia
Sparganium eurycarpum
Typha latifolia
Rumex maritimus
Mentha canadensis
Eleocharis - tall slender

There is an opening in wood at S. side of east lobe of Marble Lake, — no trees, — a gradual slope — no banks. A small rift of the same kind appears at SE. corner of Sec. bay (or lobe), — then an abrupt bank with trees. Then a wide low marshy place with low shores gradually rising — so there is a long drain to SW.

On west side of the lake the banks are again abrupt and timbered.

896 — top of hill west
850 — level of lake
46

Slope very steep.

The big woods evergreens have much Cohosh

Went over ridge to Hotties Lake — same level = 850.

Hotties lake is shallow & almost overgrown. Has big beds of rushes, — especially SW. & NW. There is a bank or slope on SE. where trees begin.

All S, SW., W. & NW. shores are low, bluffs slope back gradually, & there are no trees.

Many of the ash trees (on E side) are dying.

Below pt. XIV & above XIII
two groups of bur oaks
appear along bluff.
Also a few above XIV.
At XIV the bluff is steep
& covered with trees.
Oak type among the
on top of bluff broadly
here lichen on west
side chiefly.
Quaking aspen also,
The bluff runs down
northward & scatters
Bur oaks extend above
branches into depression
(flat basin)

Shortly after passing XIV we
dropped into a low flood — a
draw with a few scattered trees
Then slopes become a little
more abrupt to lake & a
belt of trees appears &
runs into larger forest.

The Marble Place belongs to
Mrs. Marsh of Des Moines.
It is being fixed up, — a fine
place.

Walker and Marble Lake,
there are many Rush beds
in Marble Lake.
Along its S. side rather high
& abrupt, woods nearly along.
About same level as
Spirit Lake 840.

Saw V. Bunnan Cottage

Bur oak	Dominant	Buckeye
Ironwood		Amphicarpa
Am. Elm		Cottonwood
Hackberry (somewhat larger)		"Punctata
Sambucus canadensis		Rosa blanda
Salix amygdaloides		Rhus glabra
cottonwood		Aquilegia
Ribes floridum		Campanula
Choke cherry		Viola canina
Corylus rostrata		Cryptotaenia
Vitis vulpina		Circaea
Pitted sweet		Sanicula marilandica
Salix longifolia		Zanthoxylum
Ampelopsis.		Redbud
Verbena hastata		
Pagnut		

Above this the slope is flat but there is a ~~[illegible]~~ belt of ~~[illegible]~~ elm, green ash & cottonwood — Probably has a little shelter from banks to S.E.

The ash trees have slow lichens on E. (outer) side only.)

1 or 2 bur oaks on the flat.

Another bank now rises (10-15 ft) is abrupt, with trees in its shelter. None on top.

Salix discolor in shelter of bank.

Lake 841

Banks drop to 10-12 ft. very even. Top of this lower bank 857

= 16 ft above lake

Runs 12-16

There is a plain third on top of bank lower 11, rises to 870 northward ~~[illegible]~~ ~~this~~ & there is an abrupt bank. A few bur oaks & plum are scattered about on top of bank & bluff is more heavily wooded, mostly green ash & bur oak.

Lake = 845

Top of bank = 870

25

This is at ~~X 41~~ where a high pt. runs into (25 ft) & a few oaks & plums are on top.

collected box of shells under leaves

Took bag of lichens - they were mostly on E. side of the green ash trees. All from ash.

just below Pt. XIV - Higher bluff again.

835 Lake level

855

20

Just above pt. XVI - or at it, 865 Highest pt. so far.

835

30

Went around W. side of Spirit Lake. The whole S. shore is low, with low banks on N. There was originally practically only a fringe of scattered green ash along this N. bank.
Towards S.W. corner of lake a few hardwoods & cottonwoods appear - also Am. elm.
At XI a more abrupt bank appears - 22 ft. high.

829
807 lake level
22

along the W. shore but rarely is dominant. The following also appear:
Cottonwood
Am. elm
Green ash

The willows are bunched & scattered.
The rough, irregular banks run to a point a little S. of the middle of sec. 29 & there jutting out in a flat draw which cuts off the Templeton Park ridge.
All along to the draw the trees are chiefly on the banks though scattered hardwoods extend up the gentler slope in a number of places.
Along bank of lake a few willows & cottonwoods form a fringe across sag.
At Templeton Point

top of steps	823
Lake	804
	19

Templeton Pt. (XII) is again higher, with abrupt bank 18-20 ft. above lake.
Bowlder here
Trees - Burroak
Red Elm (few)
Green ash
Basswood (few)
A swampy line W. of this grove & cuts through from shore to shore.

this part of E. side are nearly all burnt & open except for thicket along shore.

On W. side there is an open draw below Pt. X. Then banks again rise higher to pt. X.

Near Orleans the banks become low. In the upper tangle (on RR land) I saw

Solidago canadensis
Monarda mollis
Polygonatum giganteum
Rubus occidentalis (black)
Elymus canadensis
~~Dodecatheon~~ Prunus sp.
Cirsium carolinianum
Thalictrum polygamum
Lactuca canadensis
Ribes gracile
Zizania aquatica
Thalictrum dioicum
Silene stellata
Senecio — (big petals)
Ribes floridum
Aster longifolius

The timber run out toward N.E. corner & there are no trees (native) except a few bordering willows etc. The region between the two lakes is flat & sandy.

On sandy beach at Orleans on Shiner Lake

Polygonum ramosissimum
Polanisia graveolens
Xanthium
Melilotus officinalis
Salsola
Lactuca scariola
Polygonum lapathifolium
Petalostemon purpureum
Lepidium apetalum
Euphorbia strigosa
Erigeron canadensis
Gnaphalium helvolum
Ambrosia artemisiifolia
Artemisia (Vine)
Lactuca (no hairs)
Physalis pruinosa
Oxybaphus nyctaginea
Asclepias syriaca
"Sporobolus cryptandrus" (see Jerome Park list)
Verbena stricta

On the sands a little higher.

Verbena stricta
Artemisia ludoviciana
Artemisia (Fine)
Solidago rigida
Stipa spartea
Elymus canadensis
Aster multiflorus
Petalostemon purpureum
Physalis
Oenothera biennis
Physalis pruinosa
Agropyrum tenerum
Rhus glabra
Asclepias cordifolia

Lepachys pinnata
Solidago canadensis
Rosa
Helianthus exp. var.
Andropogon furcatus
Rhus trilobata
Vitis riparia
Silene stellata
Ambrosia psilostachya
Asclepias tuberosa
Poa pratensis
Desmanthus
Convolvulus sepium
Carex pennsylvanica

Aug. 4 - 1913 - Mon.

Spent night at the Antlers. Noticed in morning that the native trees extend west a block from boat landing & follow along narrow strip.

On W. side of lake above boat landing up to point N. the bluffs are close to water - 10-20 ft. high, rounded, & wooded.

The point opp. landing, on E. side, is flat and trees between road and lake.

The low rounded bluff runs around to cut off point between the two roads.

Near the center of sec. 3 the fringe along lake is willow, alder, elms, green ash & cottonwood.

Across the S.E. 1/4 of NW. 1/4 of sec. 3. the grove E. of road is mostly bur oak and runs along on a rather gentle slope. Probably if the higher bluffs & woods were not on W. side of the narrow lake there would be no woods here.

Some of the burr oaks (a few) are large & some old stumps remain.

Most of the grove, like most others, is made up of trees 6-10 in diam.

N. of draw bridge & to the Orleans the following plants were observed:

Pignut	Ribes gracile
Box elder	Rhus glabra
Burr oak (dominant)	" toxicodendron
Am. elm	Salix amygdaloides
Basswood -	
Vitis	

The first bluff of the road runs N. right near lake shore & there is only a narrow fringe of trees. E. of road the burr oak & mixed grove continues - Down near point there is a higher bluff but the grove northward is in rather a flat place, but with banks 6-8 ft. high & steep.

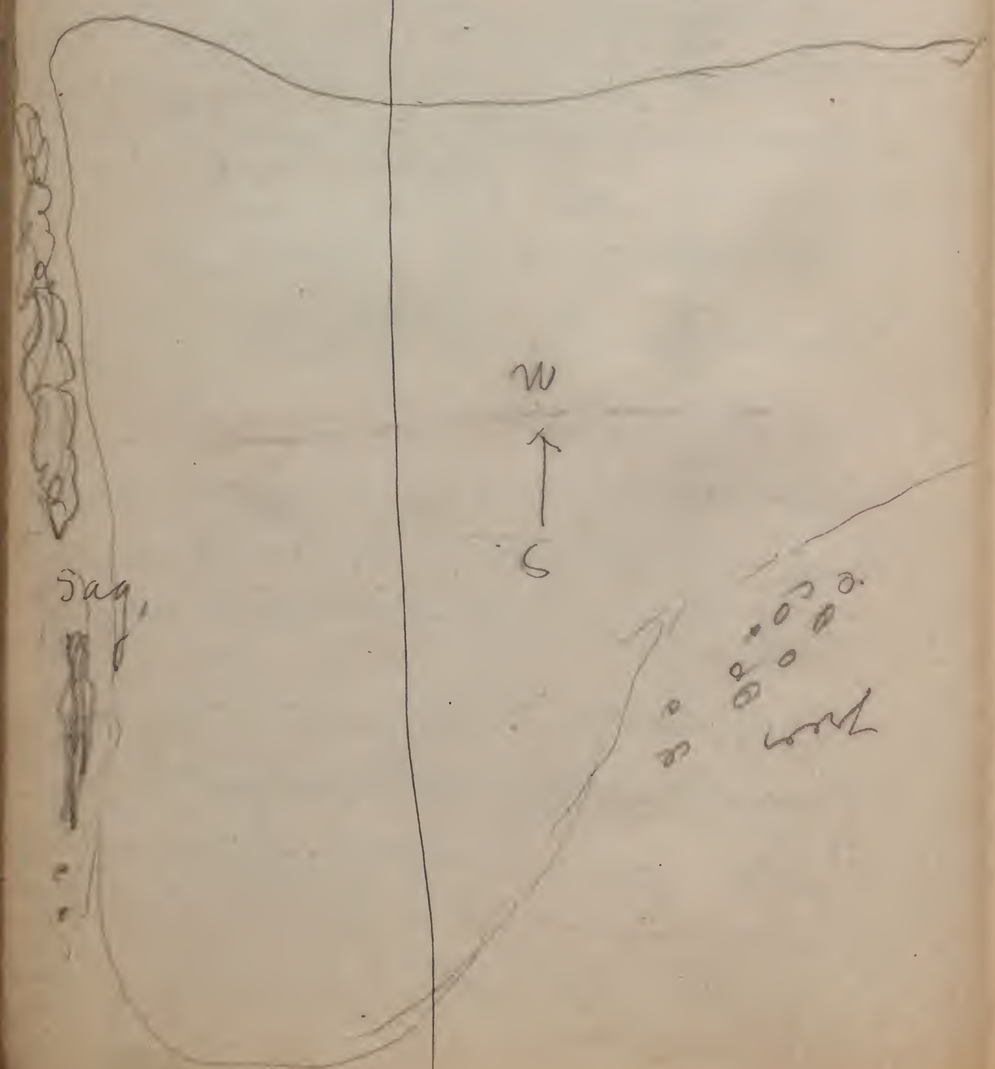
The bank runs a little higher northward - runs about 800 - 785. 10-15 ft. high. The woods on

Bluff follows around curve
> then abruptly turns E. as
a steep bank facing N.
The banks only are
timbered the top of this
narrow ridge is open.
The strip of timber runs out E.
On N. side of same draw
another bank has strip
of timber running around
to N W & NE as indicated.
a little timber above
Pt IX & on flat, but
most on this bank back
from lake.
A fringe of willows along
lake.
Point IX is flat.
the trees on flat come
to water & fringe of
greenish willows extends
along low bank to
road.
Beyond road grove
widens a little to both
sides of road, and continues so
for a short distance. Then
only on left side
The grove widens, more where
road is farther from lake &
the banks are here higher,
where road runs close to
lake the banks are
flat and only a
fringe of trees appears.

There are small boulders along beach to pt. V.
At point (V) & thence N & E the beach is sandy & the bluffs (sloping & rounded) are a short distance back, but the bottom is also tree covered. Here well protected.
The big point in the bend is wooded, with two coals from upper & E. part & several mixed in my Thus Red is
Juglans, Carpinus, alders
(both) etc. Xanthoxylum
Ostrya Prunus virginiana
Prunus americana
Persimmon Catalpa (towards)
C. mollis. Red Oak
(small cups) (several).

Where shore line begins to curve west north small boulders again abtean & There are abrupt banks from red oak in S. E. bend.
Pt. VI is just above dry creek
It is rounded & flat
Just above it & to VII the bluffs are higher (20-50 ft) & covering higher. (abruptly rounded)
Opposite VII is a large clearing
Bluffs recede above VII
& flat bottom is timbered.
Point VII is flat, sandy & treeless
From VII to VIII the bluffs recede somewhat & are flatter
roads extend to Bryant creek,
Then a flat to Pt. VIII
Just beyond VIII a short bluff 20' ft with a group of
boxwood, on S. & W. On N. side
west.

There are no high bluffs, but banks on W. side are 10-15 ft. high & there is a short bank on E. side where trees grow



Lake level = 880

High Chief 933
½ mile West

This is highest point here as I can see horizon all around.

933
Lake level = 796
137

Above bare beach above Stony Pt. stragglers come in along shore and mingle with great timber running to road.
The banks are abrupt but not high, but all along to near the front comes to lake & extends up on slope, away back. The country in this part is broken by running streams has his hangar just below Pt. T.

On E. side Prairie Lake on a slightly elevated place there is a straggling grove of low oaks & W & extends south.

On W. side a long broken ridge - only a rod or 2 wide, cuts off lake from big swamp. This ridge is timbered.

a little S. of middle the ridge is broken by narrow connection with big swamp. most of the trees are N. of this. Level of lake = 873

collected Unio shells & living Lymnea & Succinea returned

Saw many birds, blue winged teal, etc

Trees on ridge

Burnett - dominant
Crataegus (see above.)
Green Ash
Symphoricarpos vaccinifolius
Cliffe cherry
Ribes floridum (low)
Plum
Basswood

Viburnum lentago
Vitis vulpina
Poison Ivy.

The N. part of ridge is prairie along center & trees on both sides. Also this trees cut into prairie to north.

collected Vallonia gracilicosta
Pisidium compressum & P. Rubiginosum
on E wooded bank near N. end.

Big lens of cattails in NW corner of lake.

above it is a large bay & to this a drain back of my pasture ridge leads down by gradual long slope. The bay shore on S & SW is trees & sandy & pebbly. Along sandy beach of bay shore

IV.

Verbena hastata
Hordeum jubatum
Polygonum persicaria
Cyperus strigosus
Bidens maritima
Radicula palustris
Cyperus (small chestnut)
Xanthium
Polygonum (dark spot on leaf)
Lycopus sinuatus

East side of this bay is bouldery, & a narrow fringe of willow, Cottonwood, Am. Elm, Green Ash, meets the forest beyond.

the trees Brot says Pacific
thought planted out.
They are growing in gravel
& boulders where nobody
could plant them.
They are wave washed
specimens.

(at I)
The next knob. 821
795
26 ft

is a narrow boulder bar
in shelter of which a
narrow fringe of trees grows
& back of it (see) in a
hollow a bracken, green ash
group & 1 bur oak are growing
Between the middle of sec.
21 (or rather upper end of ridge
crossed by it) & point I there
is a fine overgrown boulder
ice shore ridge, & in its shelter
a narrow fringe of green ash,
ironwood, butternut, the willow

Between pts. I & II there
is a low beach & ridge
a few cottonwoods, ash, willow, ironwood, etc. along
beach — indeed, willow.
at II again rougher &
more trees.
The reverse knobs above I
are almost on level.
Back of pt. II is a swamp &
banks S. of it are abrupt &
well covered with trees.
A few stragglers also above
on S. side of knob at II —
all sheltered by ridge S.W.
The second swamp above II
also has similar timbered ridge
over grown ice shore ridge (again
sheltering fringe at start) extends
to II
Between III & IV a narrow timbered
ridge runs, ending at another
of swamp west.
III is a piece of beach at end of ridge.

collected some shells a timber side of Twin Mound. Mostly dead as everything is trampled down by cattle & it is very dry.

Form 1 living Valloniae granulata

838 Top of 2nd mound
799 Water level
39 ft.

On this I saw Brainerdia,

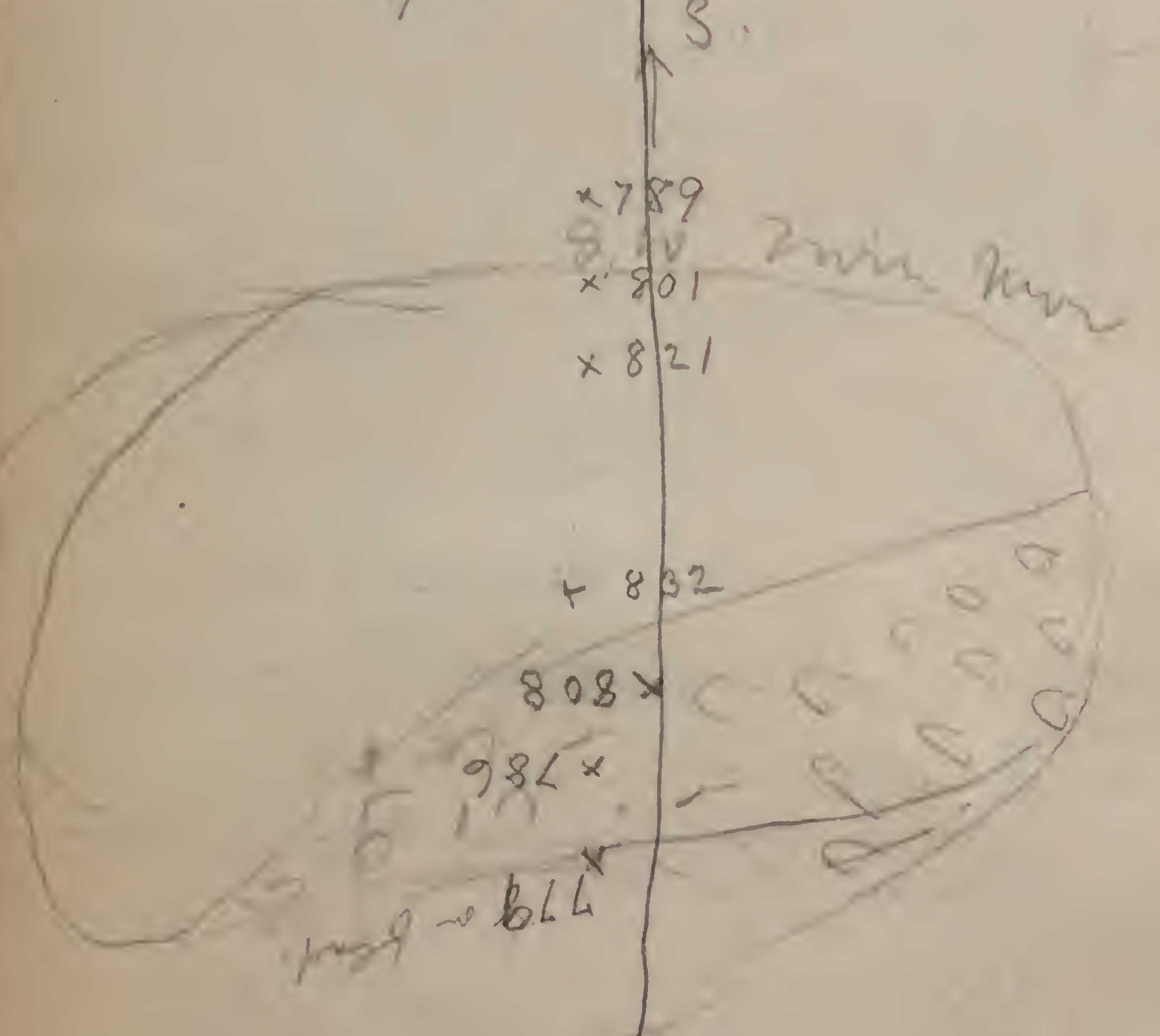
Aster exiguus mult.
Amelanchier cylindrica
" Nakina
Viola adunca
Solidago rectimacula
Arctomia (Vine)
Aster oblongifolius
Petalostemum purpureum
Bouteloua oligostachya
Oenothera canescens
Onosmodium molle
Erigeron ramosus
Lepidium densiflorum
Aster sericeus
Liatris punctata
Potentilla arguta

Solidago missouriensis
Koeleria
Stipa spartea
Prosartes esculenta
Glycyrrhiza lepidota
Gaillardia aristata
Ambrosia artemisiifolia
Petalostemum candidum
Monarda mollis
Symphoricarpos occidentalis

There are no trees on the mound.
The N. slope is less abrupt & a small branch grows at its base.
The slope beyond is mainly forested with scattered trees, widens a little in one place only.
This is low & the hills ~~chiefly~~ appear round in such way that this part is exposed in trough.
A ridge is crossed by the N. & S. middle line of sec. 21
The bank is 20 ft high & trees appear.
Between this bank & the upper Twin Mound there is a grass-grown ice-shove ridge with small bowlders.
There are a few ~~stunted~~ cottonwoods growing along shore between mound & ½ sec. line. There are

West of Twin Mound there
extends a low ridge of
boulders along that = ice shove

832 = top of S.W. Twin Mound
786
46



The trees on Twin Mound.

Bur oak

Trees on Twin Mound

Bur Oak Am. elm
Bur [illegible] Prun. am.
Vitis Ostrya
Green ash Red elm
[illegible]
Hackberry

Prairie side

Bouteloua curtipendula
" oligostachya
Solidago [illegible]
[illegible]
Solidago rigida
Petalostemon [illegible]
Oxytropis [illegible]
[illegible]
Antennaria (dracunc.
Aster [illegible]

aster
[illegible]

at edge
Scroph. [illegible]
[illegible]

Took [illegible] green ash &
bur oak near top of S.W. Twin Moun.
They extend all around tracks, –
[illegible] well exposed.

The belt of timber runs about
1/2 way to Twin Mounds from wider
portion, back of shelter of ridge,
and then, beyond small house, it tapers down
to a mere fringe of bur oak & then green
ash. The banks also run down
toward mounds and the territory to
S.W. of mounds is open, with a long
gentle slope, fully exposing
mounds.

The fringe just S.W. of mound
is green ash on boulder
ridge (ice shove) – scattered
also few [illegible] & cottonwoods
+ 1 boxelder 3 Am. elm

Sm. Clematis virginiana on
Amorpha near bridge;
Trees etc. between bridge &
main road

Pr. spinosa	Populus tremuloides
Am. elm	Ostrya
Basswood	Amelanchier
(Populus alba)	Chokecherry
Pin oak	Red elm
White ash	Crataegus mollis
Gleditsia triacanthos	Plum
Ribes gracile	Walnut
Vitis vulpina	Rhus glabra

Above 1st angle in road beyond
bridge the trees run up on a
bench about 30 ft above lake
(bluffs are about 15-20) &
S. of this is a much higher
ridge running parallel with
lake.
Where road rides above
1st angle in road there is
also a ravine running S.
The strip along N. side
runs about 100 yds out
from edge of cliff, &
bluff is abrupt
Top of bluff runs 815
786
29 ft
lake
At this point, some rods past
enough gone bullets box of
lard shells
a ravine bed runs beyond
1st widening of grove. Then
2nd hill again causes
widening

Lookout	916
Top of cliffs	830
	86

Aug. 3 - 1913

This morn left my c we rowed across to Arnold's Park

Collected Lymnaea or Hilerantheg algae, etc., along pond s.w. of Upper Gar Lake. Some were on mud. See spec.

Found water fil in some pond - see lis.

also Succinea shell on mud out of water. See spec.

also live avara(?) on beach in s. end of E. Okoboji.

They were on sticks, algae (Cladophora) etc. See spec.

786 = level Brown of E. Okoboji Lake.

The W. shore at S. end of E. Okoboji is abrupt.

The E. shore of Upper Gar is rocky where timber flat in opening. W shore abrupt with swamp part of lake.

The shore from bridge to near Twin mounds is abrupt & bouldery

Neck between Gar & E. Okoboji is flat. Few miles, Petr.

E & S. shores at Eagle pt.
are abrupt & wooded.
Swamp NW. of this where
canal goes through & swamp
all along N. side Emeriss Bay
W. of where long slough from
NE. comes in.

along N. side canal
near mouth there are
knobs & ridges 15–25 ft
above lake or sea. base
at sea comes

Looking E. the woods on E.
side of canal show almost
all live oaks, – a fine
view of them

Elm first growth

Aspen
Burnwood (dominant)
Cottonwood willow
" (minutes)
Balsamroot
Alpine Lin (on Cowles)
Choke cherry " "
Cottonwood " "
Gallia aromy " "
Alpine blue fescue " "
Bog Eyebright } Gull Pt
Grass of
Lepachys
Arbutus

Blue spruce
Green ash
Ribes prostrate
Vitis vulpina
Am. Elm
Amelanchier
Bitter sweet
Equisetum
Silene stellata
Shepherdia canadensis
Smilacina herbacea
Symphoricarpos occ

A short distance below Cove is another small bay with gravelly & sandy beach.

Below point S. the banks are abrupt & bouldery & clean to gravel Pt. low & sandy & gravelly

On this part a good example of ice shove shown by ridge of sand nearly 2 ft. high & 4-6 ft. wide.

A small bay in lake opposite Gull Pt. is low, bouldery at point, sandy & gravelly farther west.

Small bowlders & a few cottonwoods are farthest to east in Gull Pt. grove.

At " V.V. high banks, trees & bowlders,

Canal comes in a ravine.

Eagle Point is (V) & trees at tip - and small bowlders

S. side of Gull Pt. shows fine ridge of sand (ice shove) 2-4 ft high & 9 ft. wide.

Beach at Pt. has sand grass, Potentilla sapina Odaxinia etc Hordeum jubatum Rapistrum tenuum, Galeopsis

See other end of book

Aug. 1 worked with Penny

Aug. 2 - 1913 Pen Sat.

In afternoon went to Elm Crest, etc.,
There are high banks all along except at mouth of canal.
Latter has few trees, - plenty everywhere else
The lichens are all around towards on high bank at O - here well exposed all around
This point O is 26 ft. above water
Between O + P. the shore is flat + sandy, + only a few ash + willows (S. amy?) trees occupy this.
The canal here empties
Located big slough along road.
Beach at cove 764
Top of bank S. 781
17
Worth the bank rises 3 or 4 ft high
At Cove road - bank N. + S,
Boulders.
Not lichen - Tree E. on bank
are exposed ~~all around~~
lichen all around.

Elev. just S of "Jolly Pole"
water level - 788
top of hill - 830
Bluffs - about 30 ft.

The lichens are more abundant on W. sides of trees - towards the open.

Elevation at headland no. ~~4~~ 15
water level 1780
top of bluff 810
This rises a little to east

The woods run along about 300 yds. from lake shore

Found Rhinodina oreina (?) on exposed limestone boulder along lake, (See spec.)

Found that the bank of large crater in ravine N. of lower beach in lake has been cut away.

Found Amphoridium along bluff, lower end - (See spec.)

Populus tremuloides occurs at lower end - Took lichens - see rock.

Collected purchase of plants on sandy beach at Terrace Park.

See other end of beach.

Amelia Park to Emmons Bay!

(Lookback shipping 2 pages.)

Barbarea — Polemonium reptans
Smilacina bifolia — Phegopteris hexagonoptera
Polypodium vulgare — Polypodium vulgare (few)
Pteris aquilina } partly open
Solidago canadensis
Aster drummondii (?) — Amphispis
Mitella diphylla — Scrophularia marilandica
Osmorhiza nuttii
Urtica gracilis
Acorus calamus (at W edge)
Carex var. pigmea
Xanthoxylum americanum
Bitter sweet
Osmorhiza longistylis

Albany shore

Thalictrum dasycarpum
Amorpha fruticosa — Cottonwood
Cornus stolonifera — Impatiens fulva
Green ash — Alisma plantago
Am. elm — Sparganium eurycarpum
Vitis vulpina — Scirpus atrovirens
Lycopus (not deeply cut) — Potamogeton natans

The banks S. of Pillsbury Pt. are about 1.5-1.6 ft.
They are about

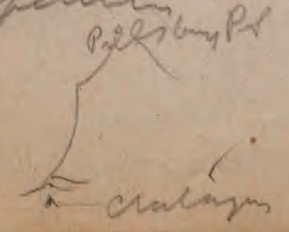
Cyperus strigosus
Penthorum sedoides

all along this bank there are open places with prairie plants such as

Helianthus scaberrimus — Lactuca canadensis (no hairs)
Elymus canadensis — Lepachys pinnata
Asclepias syriaca — Ardenia (see other)
Zizia aurea — Yellow Puccoon (Lithospermum canescens)
Amorpha canescens — Solidago rectiflora — Erysimum cheiranthoides
Brickellia stellata — Tilia stem
Solidago nemoralis — Astragalus canadensis
Symphotrichum ericoides — Aster laevis
Choke cherry — Rhus glabra
Galium boreale — Desmodium canadense
Asclepias verticillata — Bouteloua curtipendula
Anemone cylindrica — Bouteloua hirsuta
Oligoneuron rigidum — Penstemon gracilis
Silene stellata — Ruellia occidentalis
Aster ericoides (?)

Here again lichens are abundant on trees nearest edge of bluff.
See sack of lichens from Ozleys, green ash & bur oak, choke cherry, Am. Elm, Prunus, Walnut, Crataegus (on bank next to path (W.) just S. of little lookout boat house, in deep ravine S. of Pillsbury's pt. see specimen.

N. of "Dorley Oaks"



July 30

Water level — 1015

station 25 is on bank

station 26 is 5. of

center of 26. = 1018.

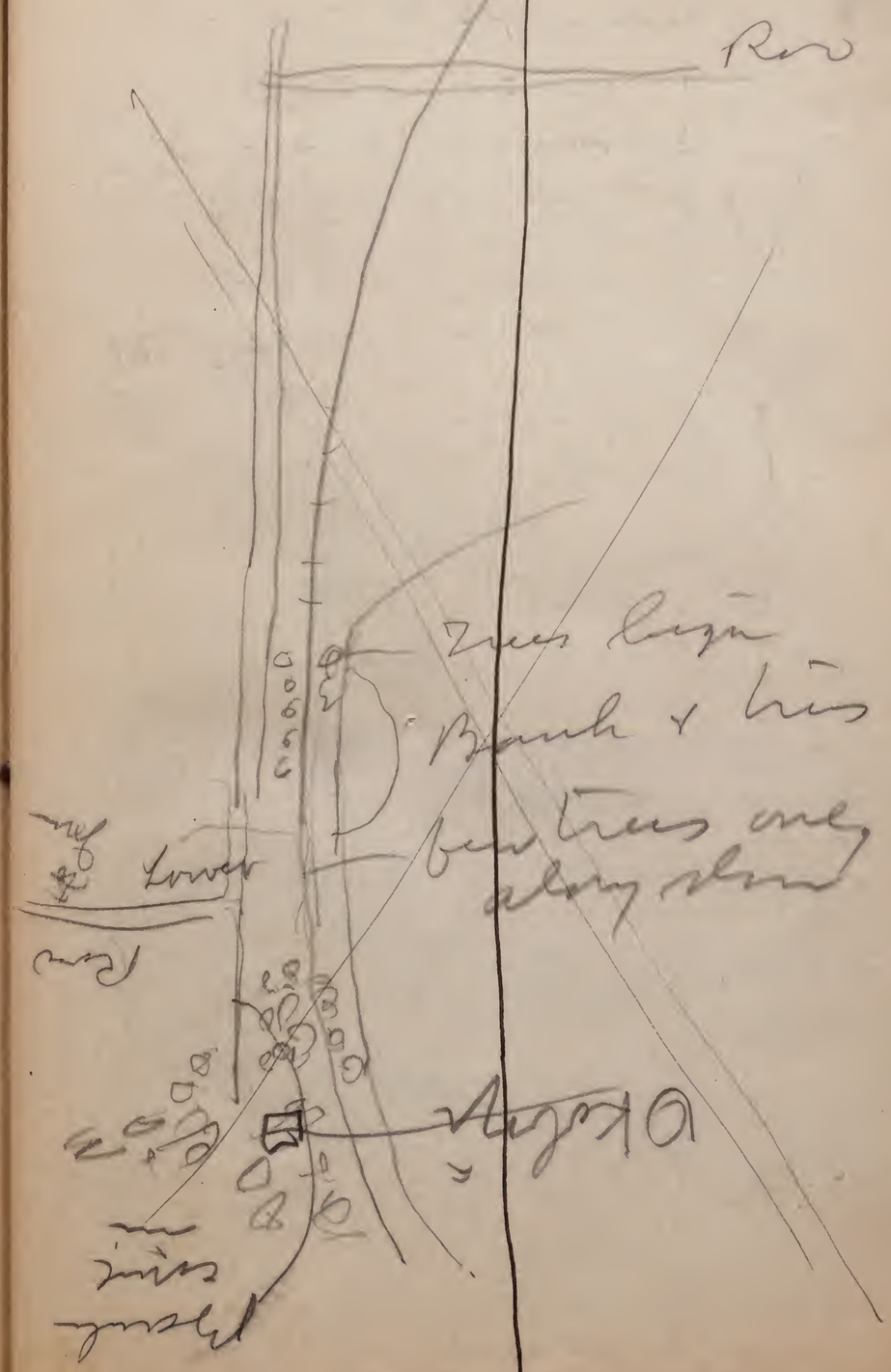
Sta 27 — 1024

Sta 28 — 1065

Top of ridge 21

(nearly top)

July 30



July 31-1913

went to Arnold's Park at 7.10
& walked south around lake.
~~Lake level 812~~ at Arnold's Park
Just south of Stevens Beach the
bluffs are not abrupt, but on part
of shore going N.W. toward
Pillsbury's Pt. The bluffs are
abrupt. Angle of row SW. of monument
read 28 – Water level West = 798
In the grove S. of Pillsbury's point
found:
green fish
Bassgrass
Crataegus mollis
" mosquella
" macracantha
" punctata
Berberis
Am. Elm
Aquilegia canad.
Lapsana virgata
Silene stellata
Clematis virginiana
Monarda
Ranunculus micranthus
Potentilla monspeliensis
Thalictrum dioicum
Cryptotaeni –

Skip next two pages

many of the outlook burials have partly dried hummocks wind!
The border is irregular & the surface broken there going together
A gradual slope W. of sec. line brings beaver almost to lake
Cirsium (heavy) in marsh
In sec 10 & 15
Spiraelia squarrosa hay
Taken from notes
Where middle line of sec. 10 & 15 strikes lake the bar ends. This out & ~~only~~ a few straggler only appear
Near W. line of sec 15 there is a steep bank 10-15 ft with small grove of birch, an Am. elm, Vitis vulpina & green ash.

a few outliers (burials) extend up the slope.
The slope from town (4) to (5) to this point is gradual (but steep somewhat) from lake northward, & almost no trees appear
7 or 200 yds W. of W. line of sec. 15 there is a low bank - 6-8 ft. - & a little bring of burial, Am. elm, ~~willow~~, ash.
They are small
Westward the shore is very flat & rises northward gradually. No trees for some distance except one occasional willow on shore.
Boots station - see elevation -
(over)

South of draw a good bur oak grove, Bluffs low here but a ridge about 1050 yds parallel to lake shore. Found Poa compressa on this ridge.

Bluffs are low, & strip of timber is about 100 yds wide. Outlets probably cut.

Present outlets all bur oak, with many lichens (see sack.)

At middle of sec 10 timber widens W.

On E. slope of bluff (top) bur oaks in open also have many lichens (need light) – Fern in deep woods.

The bluffs both N. & S. of ½ sec. line are abrupt. Opposite shore is flat.

In woods are –

Pilea pumila
Lobelia cardinalis
Mentha canadensis
Verbena urticifolia
Urtica gracilis
Parietaria pennsylvanica
(Little Blue Lobelia)
Circaea lutetiana
Viola canadensis
Acer negundo (young)
Geum virginianum
Veronica virginica (tender)

S. of ½ sec line the surface is somewhat broken, & at 2 points shows prairie tongues from S.W. into woods.

In sec. 10 at entrance to a tongue Grindelia squarrosa was very abundant, just beginning to flower.

for 150 yds 20. of table
& along abrupt bluff,
here about 20 - 25
ft high, I saw
cottonwood,
greenash,
[illegible] ft,
Willow next
Amorpha fruticosa.
Choke cherry Ostrya
Plum Ulmus fulva
wild grape.
Hackberry
Prickly ash
Ribes gracile
Rhus vulgaris

On sec. line bur oaks
run about 100 yds W.
(some probably cleared)
& N. of section line on
lake bluff a dense
thicket, shrubs, etc.
a road on section line.
Right on section line
just N. of it a prairie
opening runs almost

to lake shore (between 2 & 3) flat here,
& a draw to S.W.
just S. of sec. line in a
hollow a grove of burr oaks
greenash, etc
. the few burr oaks in clearing
N. of road are dying
about 8 rods S. of sec. line
is a low draw, trees,
& swampy - only 2 rods
wide or a little more
Approach to it grassed
Bordering just on both N. & S.
sides is trees
The little boy has Lemna
~~Sparganium~~ in it.
~~Scirpus~~ atrovirens
Asclepias incarnata
Eupatorium perfoliatum
Thalictrum cornuti
~~Aristolochia (macrophylla)~~

Lyman & Phyo - box no. 4.
This season has 2 large
Salix amygdaloides

July 30, 1913

Trip from Stone Lake S. on W. side E. Okoboji.

at drawbridge water = 1000 ft

S. of drawbridge - 2 blocks - S. along street & 1½ block west = 1038.

original forest runs at least 4 blocks W. from lake & in W. part is all burned - timber not so complete, with some clearing.

1 long block S. & many blocks (about highest pt.) = 1055

This is about 2 blocks E. of lake.

On E. side lake a low bluff, timbered, & it a low slope, gradually ascending with only brush & trees

1 long block north - about 3/4 sec. S. of ½ sec. line bluffs run about 20 ft & then slope upward west. 7 rise of timber

Reading 5 rod E. of road at lake level = 1005

On 3/4 sec line Cercocarpus & brush bushes appear on upper slope